The impact of foreign aid on economic development in fragile states

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ABSTRACT

Over the past decade, fragile states has become a resonant term in the development lexicon, frequently employed to draw attention to the need to assist these countries. Among other reasons, external intervention has been justified by their lagging performance in the achievement of development outcomes and the threats they impose to global security and stability.

Still, fragile states impose a dilemma. Although they are in great need of development assistance, aid towards these countries is expected to be less effective. This is the starting point of this thesis, which contributes to the understanding of the effect of foreign aid on economic development in fragile states, using political economy theory and standard econometric techniques.

A review of existing measures of state fragility highlights that most of them lack a strong theoretical grounding, thus confusing causes and outcomes of fragility. This thesis suggests an alternative measurement approach that draws on Besley and Persson's (2011a) theoretical model, and uses principal component analysis to derive an index for each of the two core dimensions of fragility: state ineffectiveness and political violence. This distinction follows a recent call for using multidimensional approaches and finds support in an exploratory cluster analysis.

This thesis then contributes to the quantitative studies examining the fragility-growth link by replacing the CPIA with the two obtained indices as proxies for fragility and considering the effects of distinct dimensions separately. Using data for the period 1993-2012, the results from regression analysis show distinct effects for each dimension and find no significant impact of fragility on growth when employing a single index.

Finally, inspired by the empirical aid effectiveness literature, this thesis tests the proposition that aid is less effective in promoting growth in countries with higher levels of state ineffectiveness or political violence. The results show no support for this hypothesis.

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LIST OF ACRONYMS AND ABBREVIATIONS

2SLS	Two-Stage Least Squares
ALC	Authority, Legitimacy and Capacity framework
BERI	Business Environmental Risk Intelligence
CIDA	Canadian International Development Agency
CIFP	Country Indicators for Foreign Policy
CPIA	Country Policy and Institutional Assessment
DFID	United Kingdom's Department for International Development
ERD	European Report on Development
FE	Fixed-effects
FSI	Fragile States Index
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
ICRG	International Country Risk Guide
IDA	International Development Association
ISW	Index of State Weakness in the Developing World
IV	Instrumental Variables
KMO	Kaiser-Meyer-Olkin measure of sampling adequacy
LICUS	Low Income Countries Under Stress
LIML	Limited Information Maximum Likelihood
LM	Lagrange-Multiplier
M2	Money and quasi money
MAT	Monopoly of Violence, Administration and Territorial Reach database
MDGs	Millennium Development Goals
ODA	Official Development Assistance

OECD	Organisation for Economic Co-operation and Development
OECD-DAC	Development Assistance Committee of the Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PITF	Political Instability Task Force
PV	Political violence
SDGs	Sustainable Development Goals
SE	State effectiveness
SFI	State Fragility Index
SIDS	Small island developing states
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
US	United States of America
USAID	United States Agency for International Development
VIF	Variance inflation factors

CHAPTER 1. INTRODUCTION

"Ascriptions of fragility are often warnings for they are understood to mean that breakage is easily brought about. An accidental dropping or knocking [of objects such as vases and panes of glass] is very likely to result in smashing. It seems that although virtually all objects are breakable, it is only those which break easily, under very little force of impact and in a wide variety of circumstances, that are called fragile.

(…)

In the case of fragility, the typical manifestation is breakage. (…) A vase may be fragile and may have been so for centuries though it has never manifested its fragility in an actual breakage."

Mumford, S. 2003. "Threats and Promises" in *Dispositions*, Oxford Scholarship Online.

1.1. RESEARCH CONTEXT

The term "fragile states" has assumed a prominent position in the development discourse over the recent decades. Despite its criticism as a "portmanteau word", a "catch-all phrase", an "all-encompassing label", and ultimately a "wicked problem"[1], the expression remains ubiquitous in the development lexicon. Often used in relation to, or interchangeably with, other related expressions, such as "weak", "failing", "failed", or "collapsed" states,[2] the phrase has been employed by academic institutions and different development organisations to describe situations where there is a lack of capacity and/or willingness of the state to perform a predetermined set of core functions.

Concepts such as "state failure" and "state collapse" had been applied before within the field of international relations. However, it was only after a change in the views regarding human and global security, and the link between conflict and development, that international organisations and academics started to employ the term "fragile

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[1] In order of appearance, these expressions have been employed by Nay (2013), Patrick (2007), Bertoli and Ticci (2012), and Brinkerhoff (2014). See their work, as well as Gutierrez Sanin (2011), for recent reviews of the concept.

[2] As well as "difficult partnerships", "difficult environments", "poor performers", and "situations of fragility".

states" with development concerns. More specifically, three main reasons have contributed to the prominent position of the term in the development discourse. Firstly, a series of events in the 1990s, namely the Cold War and the failure of the Soviet Union, resulted in an increasing concern with the dissolution of state institutions and the implications of internal conflict to international security. Second, the attacks of the 9/11 contributed to a new understanding of the relation between underdevelopment and conflict. Finally, the view that good policies and institutions are crucial for development that emerged at the end of the 1990s - and which served as the basis for aid selectivity during this period - created a "Samaritan's Dilemma" for development assistance: poor performers in policy and institutional indicators received less aid, but at the same time they were those that needed it the most. The following paragraphs explore the effects of these events in more detail.[3]

1.1.1. The dissolution of the state and internal conflict

The end of the Cold War in 1989 and the failure of the Soviet Union were two important marks for the debate around failure and collapse. With the end of Cold War came a new understanding of state collapse as having an impact on the international system as whole instead of having limited, easily controlled effects (Clapham, 2002: 784). In addition to that, the emergence of new forms of conflict, different from the conventional model of warfare – such as the outbreak of wars in Bosnia and Croatia or the factional conflicts in Somalia (Nay, 2013: 327) –, triggered the beginning of a new focus on intrastate conflict and on different conceptualisations of state failure (Carment, Samy and Prest, 2008: 352). The failure of the Soviet Union undermined the view of the solid character of statehood, given that one of the two superpowers, with great surface area and large population, had just collapsed (Clapham, 2002: 784).

Thus, the term emerged to describe the proliferation of new sorts of armed conflicts, and, in some cases, their impact on the disintegration of state institutions and on deteriorated security conditions (Nay, 2013: 327; Call, 2010: 305). This is particularly apparent in political science accounts in the 1990s and early 2000s. For instance, Helman and Ratner (1993: 3) describe a "new phenomenon" of "failed nation-state, utterly incapable of sustaining itself as a member of the international community", characterised by civil strife, government breakdown, and economic privation. Similarly,

[3] I refer to Wennmann (2010) for a more extensive overview of the evolution of the fragile states discourse.

Rotberg (2002, 2004) describes failed states as "tense, deeply conflicted, dangerous, and bitterly contested by warring factions" (Rotberg, 2002: 85). It also became clear at this point that the traditional response from the international community had not been successful or adequate.

The attacks of 11 September 2001 gave a new impetus to these concerns, especially for the governments of the United States (US) and Western European countries, which also had reflections on the academic field of international security. The fact that Afghanistan, regarded as a failed state, had provided a safe haven for the planning of the attacks indicated that these states were a potential threat for international security as they were places where terrorism and crime could flourish. At this point, the attention was less focused on the extreme cases of state failure or state collapse, referred to above, but instead on how to identify the malfunctions that could lead to those situations.

This concern with security stems from a change in the views of the international community on how development and international security were linked. According to this new perspective, the inability of states to provide essential services and security to their citizens alongside continuing political tensions would create obstacles to sustained development, and therefore potentially threaten regional or global security (Nay, 2013: 327). According to Bhuta (2012a: 235), state-funded development agencies introduced the notion of "fragile state" to designate a broad-ranging development-programming agenda that recast development assistance as an instrument to promote political stability and peace. Some even suggest that "the topic of fragile states only gained major prominence when – and because – it was framed in the contexts of the security discourse of the major developed states" (Boege et al., 2008: 17).

1.1.2. The role of the state in development performance

Following the crises in the 1970s, the 'structural adjustment programmes' were imposed to many developing countries with the aim of "correcting" the mistakes made by governments in these countries. According to the influential Berg Report (World Bank, 1981: 4), Africa's "disappointing performance" had been influenced by "internal constraints based on 'structural' factors" and "a set of external factors", both "exacerbated by economic policy inadequacies". In order to remedy this damage, neoliberal reforms would contribute to a sound macroeconomic management but, some argued, at the cost of undercutting the mechanisms used by governments to maintain their power and their fragile state authority (Clapham, 2002: 783).

However, it was not long before the focus was shifted from the free functioning of the markets to the importance of the state in promoting growth. The disappointing record of the results of the structural adjustment programmes led, by the end of the 1980s, to an increased debate around the relationship between institutions and patterns of development. Countries were facing problems associated with economic instability, retrenchment of state activities, limited growth and high inequality, which showed that "development as usual appeared to be ineffective or even counterproductive" (Carment, Samy and Prest, 2008: 352).

In the beginning of the 2000s, development agencies started talking about "difficult partners", "difficult environments", or "low-income countries under stress". There was a renewed focus on how to provide assistance to these countries, especially after the seminal paper by Burnside and Dollar (2000) who argued that aid is more effective in countries pursuing "good policies". The discourse around the desirability of promoting "good governance" in order to foster economic growth and development started to spread, and triggered a view that emphasised institutional failures and mismanagement as reasons for state collapse (Doornbos, 2002: 806). According to these ideas, the mitigation of governance or state failures and fragility could be achieved by following the right policies, or, in other words, "setting up the right processes" (Hameiri, 2007: 128).

This link between fragility and development was also reflected in the policy discourse. According to the World Bank (2005):

> *"The impact of this vicious circle is clearly seen in development outcomes in fragile states. LICUS have twice the income poverty and child mortality rates of other low income countries; they also pose a risk of negative spillovers for their neighbors and the wider global community, through spread of conflict and organized crime, refugee flows, epidemic diseases, and barriers to trade and investment. Improving the international response in these countries is a critical development challenge." (World Bank, 2005: v)*

The United Kingdom's Department for International Development (DFID) concurs to this view: "[w]e need to work better in fragile states because poverty is so widespread, because they can destabilize regional and global security, and because the costs of late response to crisis are high" (DFID, 2005: 9). Two years later, the European Commission (2007: 4) highlights that "[f]ragile situations constitute a particular challenge as an obstacle to sustainable development, equitable growth and peace, and creating regional instability, security risks at global level, uncontrolled migration flows, etc." Later, the European Report on Development (2009) is entirely dedicated to discussing fragility in Africa.

Thus, providing assistance to, and sometimes intervening in, fragile states was increasingly justified on the basis of: i) the economic and human costs borne by these and neighbouring countries (Chauvet and Collier, 2004); ii) the threats these countries imposed to regional and global security and stability (European Report on Development, 2009); and iii) the fact that they were also plagued by high levels of poverty, and had a slower progress towards the Millennium Development Goals (MDGs) when compared to other developing countries (OECD, 2012; 2014; 2016). Still, plagued by a lack of will or capacity of the state to perform its core functions, and frequently also by political violence, fragile states impose great challenges for the effectiveness of development assistance. This thesis is interested in exploring this quandary by uncovering some of the links between state fragility, development assistance, and development.

1.2. RESEARCH QUESTIONS AND APPROACH

1.2.1. Research questions

The aforementioned dilemma is the starting point of this thesis, which aims to contribute to the understanding of the impact of foreign aid on economic development in fragile states. In order to achieve this, when making theoretical considerations (especially when conceptualising state fragility) this thesis follows the discipline of political economy. In the empirical analyses, this thesis employs econometric methods which are standard within the economics tradition and allow one to assess the predictions from theory[4].

In the process of finding an answer, and before testing the proposition that aid is less effective in fragile states, this thesis takes on two other challenges. The first is related to the concept of state fragility and is the subject of Part I of the thesis, which is guided by a concern with defining state fragility and finding an appropriate measurement instrument for this phenomenon.

Once the definition of state fragility is clear, and before considering aid effectiveness, this thesis engages with the link between state fragility and economic development,

[4] In so doing, this approach follows an epistemological approach of critical realism.

looking more specifically at economic growth as the development outcome. This is done in the beginning of Part II. In the final empirical chapter, the hypothesis that aid is less effective in fragile states is put under scrutiny. A more detailed description of each of the chapters included is provided below.

1.2.2. The state as the primary unit of analysis

Given that throughout this thesis there is an overall focus on the role of the state in society, I briefly justify the choice of using the state as my primary unit of analysis. It has been argued in the literature that the notion of fragile states is based on a narrow state-centric perspective and consequently suffers from analytical reductionism (Boege et al., 2009; Nay, 2013: 333; Lambach, Johais and Bayer, 2015). The basic argument is that there is a propensity to focus on formal state institutions, and that stifles efforts to a better understanding of the institutions and arenas external to the state sphere, particularly networks and informal economies. As described in Boege et al. (2009: 24), cases of state fragility are usually characterised by the existence of diverse and competing claims to power, as well as coexisting, overlapping and intertwining logics of order. This undercuts the privileged position of provider of security, welfare and representation that is usually attributed to the state, as "it has to share authority, legitimacy and capacity with other structures" (Boege et al., 2009: 24). Hameiri (2007: 123) contributes to this argument by claiming that the current view neglects the fact that power and conflict are intrinsic elements of the phenomenon of the state. The author highlights some consequences of defining state failure in relation to state capacity, namely, its confliction of politics with governance that originates a technocratic view of the state.

While conceding that these are pertinent points, I argue that a focus on the state as a central unit helps identify the sources of its fragility and does not deviate the attention from other actors in society. Additionally, I concur with the reasons expressed by Gravingholt, Ziaja and Kreibaum (2012: 1) for maintaining this perspective. More specifically, these authors argue that: i) most actors in development policy (e.g. donor countries and multilateral institutions) have country-based operation models and allocation systems; and also that ii) notwithstanding the increasing prominence of non-state actors, states retain their role as important players and objects of activities in the international system. Furthermore, as pointed out by Carment, Prest and Samy's (2009: 76), the state is "a constrained but primary actor in international politics".

Finally, and following closely the arguments used by Lambach, Johais and Bayer (2015) to justify their focus on the state when conceptualising state collapse, there is a pragmatic reason from a methodological point of view. One of the main aims of this thesis is to improve the empirical analysis of state fragility, which requires a concept of the state that is susceptible to comparative research. The view of the state used in this thesis (and described in detail in Chapter 3) follows the ideal-type definition, which underlies most of the conceptualisations of fragile states used in existing literature.

1.3. OUTLINE OF THE THESIS AND MAIN CONTRIBUTIONS TO THE LITERATURE

The main contribution of this thesis is to propose an alternative measure of state fragility that has some advantages when compared to previous approaches. First, it is based on a sound theoretical grounding, and thus avoids the confusion between causes and consequences of state fragility. The overview in Chapter 2 reviews the existing approaches to operationalise this concept, focusing, in particular, on their theoretical underpinnings and highlights that, with a few exceptions, current proposals do not provide a clear discussion of the theoretical roots underlying their approaches, and lack clarity in terms of the distinction between causes and consequences of state fragility.[5] The proposal in this thesis draws from Besley and Persson's (2011a) model, which provides a clear distinction between causes, symptoms and outcomes, and suggests state ineffectiveness and political violence as the symptoms of state fragility.

Second, by proposing this multidimensional approach, it contributes to unpacking the complexity of the phenomenon. As described in detail in Chapter 3, the measurement proposal in this thesis considers the aforementioned two symptoms as the core dimensions of state fragility and uses principal component analysis to derive an index for each of them. This distinction follows a recent call for the use of multidimensional approaches to unpack the complexity of the term, and it found support in the exploratory cluster analysis in the same chapter, which reveals the existence of patterns of countries according to the two dimensions.

Third, the obtained indices offer an alternative way of making the concept of state fragility operational for further analysis. The summary of the main limitations of the

[5] An abridged version of this chapter has been published as an article in the journal Third World Quarterly. See full reference for Ferreira (2017) in the list of references.

most widely used fragility indices in in Chapter 2 suggests that there is room for improvement in terms of measurement instruments. Bearing this in mind, this approach provides a continuous measure for state ineffectiveness and political violence, and thus it departs from a dichotomous distinction between fragile and non-fragile states based on the establishment of *ad hoc* cut-off points. Additionally, when compared to the Country Policy and Institutional Assessment (CPIA) index – the most widely used measure of state fragility – the approach in this thesis proves advantageous because: i) it is derived from publicly available sources and can be easily replicated; ii) covers a larger number of countries; and iii) it is more comprehensive as a measure of state fragility as it also considers political violence.

The construction of the two indices and some descriptive analysis of the main scores are provided in Chapter 3, and this thesis then provides two empirical applications of the proposed measure of state fragility. First, the obtained indices are employed to explore the impact of state ineffectiveness and political violence on economic growth. The review of the empirical literature on the fragility-growth link highlights that, despite the multitude of studies exploring similar relationships, only a handful of studies explicitly engaged with the cross-country evidence on the effects of state fragility on growth. In particular, most of these accounts were based on the CPIA as a proxy measure of state fragility and none of them considered the effects of distinct dimensions of fragility. Chapter 4 uses standard econometric methods and data for the period 1993-2012 to estimate growth regressions. It replaces the CPIA with the two obtained indices as proxies for fragility and considers the effects of each symptom separately.

The results concur with the argument that one should examine the impact of state ineffectiveness and political violence separately. They show distinct effects for each dimension, but fail to find any evidence of an impact of state fragility on growth when a unidimensional index is employed. More specifically, the coefficients obtained from considering cross-country and panel datasets, as well as different time periods, time horizons, country samples, and estimation techniques suggest that, as expected, state ineffectiveness has a significant negative effect on economic growth. The coefficients estimated for political violence are more at odds with the theoretical predictions as there is some evidence of a positive effect of this variable on growth. However, this result is not robust to variations in the specifications used. Additionally, the analysis in this chapter considers a possible interactive effect between the two symptoms, but it finds no evidence that the effect of state ineffectiveness (or political violence) on economic growth in a country depends on the level of political violence (or state ineffectiveness).

The second empirical application is motivated by the aforementioned dilemma faced by donor organisations. With this in mind, Chapter 5 tests the proposition that aid is less effective in promoting growth in countries with a higher degree of state fragility. The chapter follows the well-established aid effectiveness literature and explores the sign and significance level of an interactive effect between aid and each of the symptoms, employing as measures the indices derived before. The results obtained with standard econometric methods for the period 1993-2012 show no statistically significant impact of either state ineffectiveness or political violence on the effectiveness of aid in promoting growth. Furthermore, the coefficient obtained after adding a triple interaction term between the three variables does not suggest that aid is even less effective when the country scores high in both of these dimensions.

Finally, Chapter 6 brings together the insights from the previous chapters and summarises the main lessons learnt.

PART I. DEFINING AND MEASURING STATE FRAGILITY

CHAPTER 2. MEASURING STATE FRAGILITY: A REVIEW OF EXISTING APPROACHES[6]

2.1. INTRODUCTION

Over a decade has passed since the term "fragile states" was adopted in the development vocabulary. The literature is now extensive and reflects the concerns of policymakers and the donor community over security and development as well as the urgency from academics to provide answers to their questions.

A growing number of review studies have engaged with different aspects of the fragile states discourse. In the early 2000s, there was a lack of consensus on how to define the term, and a tendency to use it interchangeably with other expressions, such as "weak performers", "failing states" or "failed states". In the face of these disparate views, some authors have attempted to organise the lexicon by describing the evolution of the term, and by attempting to categorise existing definitions (e.g. Cammack et al., 2006; Engberg-Pederson, Anderson and Stepputat, 2008; Bertoli and Ticci, 2012).

This increasing popularity, but also confusion, in the use of the term has led to the emergence of several critical voices, motivated by the political aspects inherent to labelling a country as a "fragile state". While some have focused on the concept itself (Boege et al., 2009; Nay, 2013), others have looked more broadly at the discourse on state fragility. Among the latter studies, a few authors have discussed the (lack of sound) theoretical groundings of related concepts, such as state failure (Hameiri, 2007; Di John, 2010[7]). More recently, a growing number of studies have looked into the underlying agendas of donors and recipient countries, and, specifically, into the political aspects inherent to the concept of fragile states (Cammack et al., 2006; Hout, 2010; Barakat and Larson, 2014). Grimm, Lemay-Hebert and Nay (2014) distinguish between "problem solvers", who focus on performance issues and provide policy recommendations, and

[6] An abridged version of this chapter has been published as an article in the journal Third World Quarterly. See full reference for Ferreira (2017) in the list of references.
[7] See also Milliken and Krause (2002), Boas and Jennings (2005), Di John (2008), and, more recently, Ayers (2012) and Hampel (2015) for critical analyses of the concept of state failure and the ideology behind it.

"critical scholars", who question the values and assumptions underlying the concept.[8] Notwithstanding the existing scepticism, according to Brinkerhoff (2014), the "wicked problems" of state fragility and failure remain in good currency despite their weaknesses.

In parallel to the concerns with how to deal with fragile states, there was an obvious need to identify the countries that fell under that category. This was met by a profusion of quantification efforts, which either adopted existing indices, such as the CPIA (Country Policy and Institutional Assessment), to obtain lists of fragile states, or developed alternative measures, expressly aimed at measuring state fragility (e.g. Fragile States Index, State Fragility Index). Yet, similarly to the attempts to define the concept, agreement is yet to be reached on how to measure state fragility. Different frameworks and methodologies have resulted in diverse lists and rankings of fragile states. These measures, and especially the popular use of indices, have been the object of scrutiny by different authors. Touching upon issues of conceptualisation, methodological approaches, and related technical aspects (e.g. coding and aggregation procedures), studies by Fabra Mata and Ziaja (2009), Ziaja and Fabra Mata (2010), Wennmann (2010) and Gutierrez Sanin (2011) have pointed out several limitations to the existing measures. The latter provides a comprehensive assessment of measurement instruments, identifying some problems emerging in different stages of index building, and highlighting the importance of a sound theoretical grounding for maintaining coherence in the construction of the measure.

The aim of this chapter is to contribute to existing reviews by focusing on the attempts to operationalise the concept of state fragility, departing from existing studies that concentrate exclusively on the definitions of fragile states. The aim is to build upon the aforementioned work focusing on the implications of a lack of definitional clarity, and to scrutinise the theoretical roots of existing conceptualisations, in line with previous studies looking at the theory underlying the concept of state failure. It is argued that, with rare exceptions, there is a failure to discuss clearly the theoretical underpinnings upon which they are based. Additionally, none of the reviewed approaches provides a clear distinction between symptoms and causes of state fragility.[9]

[8] This is the introduction to a special issue on fragile states. See the full issue for more detailed accounts of how the concept is used by different development actors, from donor agencies to governments.
[9] Similar arguments have been advanced before, for instance, in Besley and Persson (2011a) and Lambach, Johais and Bayer (2015).

The reports on fragility indices referred to above already offer a comprehensive and thorough scrutiny of the methodology employed in their construction. Thus, I here provide, as a secondary contribution, a summary of the drawbacks identified in these measures, according to the definition of the term, the choice and aggregation of indicators, and the interpretation and use of the obtained results. This overview indicates that, notwithstanding the challenges inherent to operationalising political science concepts, there is room for improvement in terms of quantifying state fragility.

The chapter is structured as follows. The next section offers an outline of existing approaches for measuring state fragility. The third section is concerned with scrutinising their theoretical groundings. This is followed by a synopsis of the main limitations of existing fragility indices, whereas the final section summarises the key conclusions and offers some suggestions for future analysis.

2.2. OVERVIEW OF EXISTING APPROACHES

As the term became more and more ingrained in the development discourse, there was a growing concern with identifying the countries deemed as "fragile states", which in turn required some form of quantitative assessment of fragility. In response to this need, a number of analytical tools emerged aimed at operationalising the concept and measuring different dimensions of state fragility. The baseline is the identification of a set of indicators that capture these perceived dimensions. Frequently, though not exclusively, these indicators are then aggregated to obtain an index of fragile states. In some cases, this measure serves as a basis to establish a threshold level below which countries will be classified as fragile states, and/or to form rankings of countries. In other cases, the analytical exercises result in the identification of different categories of fragile states.

The following paragraphs provide more detail about the existing tools to measure state fragility, differentiating between approaches that provide: i) no rankings of countries or only partial rankings of countries within those groups; and ii) overall rankings of countries according to their degree of fragility.

2.2.1. No ranking or partial rankings of fragile states

I start by considering the first group of proposals, which focus on identifying different groups of fragile states, based on specific criteria. Table 1 includes a summary of their main characteristics.

Stewart and Brown (2009) provide lists of countries according to the number of classifications of "failure" or "risk" in each of the dimensions identified (authority, service delivery and legitimacy), but no ordering of the countries is attempted. More specifically, different indicators are used for each dimension, considering distinct thresholds for situations of failure and risk of failure[10]. The same applies to Goldstone et al. (2003), who, apart from a distinction between failing and failed states, only discuss examples of countries that fit into each of the ten (five for each category), non-comparable, stylized scenarios they identify. These stylized scenarios are derived using a methodology that comprises five sequential steps, and serve as a basis to identify adequate strategies for intervention.

In the case of the approaches providing partial rankings of countries, these refer only to the groups identified in the analysis. Call's (2010) conceptualisation of fragility distinguishes between three "gaps" – in authority, legitimacy and capacity. The author provides a ranking of the top 20 of countries with the worst performance in each of these dimensions, based on their score in the indicator considered for each of the gaps. This division is used to provide some guidance for response in countries corresponding to each category, and some examples of countries experiencing one, two and all of the gaps are also included. Gravingholt, Ziaja and Kreibaum (2012) obtain clusters of countries according to similar criteria and provide country rankings for each group using their degree of "typicality". These authors consider a set of indicators for each of the dimensions of fragility they identify (authority, capacity and legitimacy). A mixture model[11] is used to obtain different clusters of countries according to different

[10] In the case of the service delivery, both absolute and progressive measures are considered. The progressive measure aims to take into account the structural differences between countries. For instance, the level of services considered to be causing failure varies according to the wealth of the country. This is achieved by considering the extent to which countries fall below what would be the expected level of service delivery according to their level of per capita income (Stewart and Brown, 2010: 13).

[11] This is a modelling approach to clustering which assumes that the observations come from a mixture distribution, and that each component in the mixture represents one of the clusters (Cox, 2005: 97). The algorithm attempts to fit two or more (multivariate) normal distributions within the "observed" distributions of the input variable, the idea being to find groups of countries by considering the sample's shape (Gravingholt, Ziaja and Kreibaum, 2012: 12).

Table 1. Proposals providing no ranking or partial rankings of fragile states

Reference	***Concept***	***Definition and Dimensions***	***Theoretical roots***	***Indicators and methodology***	***Categories***
Call (2010)	Failed states Fragile states	The definition of fragility is based on gaps in three dimensions: capacity, security, and legitimacy.	The rationale for each of the dimensions is explained, but there is no discussion of its theoretical foundations.	Capacity is proxied by the immunisation rates, security by Rice and Patrick's (2008) index of security, and the indicator of legitimacy is a combination of the ratings of political rights in the Polity IV dataset with civil liberties rankings of Freedom House in 2006. The indicators are not aggregated.	Proposes a categorisation according to the particular gaps they confront. Countries are designated as follows: "weak states", when experiencing a capacity gap; "war-torn states" when experiencing a security gap; "repressive autocracies", when experiencing a legitimacy gap.
Goldstone et al. (2003)	Failing states Failed states	"States that are "failing," "in failure," or "recovering from failure," may be considered as all – in varying degrees – fragile states." (p.3) The capacity of the state can be assessed according to four dimensions of state-society relations: political, economic, social, and security. The combination of loss of effectiveness and legitimacy in each of these four dimensions results in state failure.	State fragility and failure are seen in relation to stability. The analysis is built upon an institutionalist perspective, according to which "[w]hen states are failing, failed, or recovering, lasting stabilization depends on rebuilding institutions in ways that provide lasting incentives to cooperative behaviour" (p.6). Based on this assumption, the authors build an institutional model.	Definition of warning signs based on thresholds for effectiveness and legitimacy in each of the four dimensions. Proposes five sequential steps to identify stylized scenarios and propose treatment strategies.	The two overall categories distinguish between failing and failed states, and within each of these groups five stylised scenarios are identified.
Gravingholt, Ziaja and Kreibaum (2012; 2015)	State fragility	Fragility is conceptualised as the inverse of statehood, which in turn comprises three dimensions: authority, capacity and legitimacy.	It is argued that each of the three dimensions has been the focus of a certain strand of political theory and represents a particular type of state-society relation. (p.7) The concept of authority is based on a corporatist strand of political theory, state capacity draws from the idea of the existence of a contractual relationship between state and society, and legitimacy is derived from the constructivist perspective on the state.	The indicators of authority are monopoly of violence, homicides and battle deaths. Capacity is proxied by under-5 mortality, primary enrolment, access to water, and basic administration. The indicators of legitimacy are physical integrity rights violations, press freedom violations, and granted asylums by country of origin. Indicators are aggregated by using the minimum value that any of the indicators takes in a given country year. A mixture model is employed to identify clusters of countries, based on the sample's shape.	Based on the three dimensions, six groups of countries are identified, with a seventh group formed by the group of countries not included in the groupings because of their high level of uncertainty. Typical countries are identified for each group.

Table 1. Proposals providing no ranking or partial rankings of fragile states

Reference	***Concept***	***Definition and Dimensions***	***Theoretical roots***	***Indicators and methodology***	***Categories***
Stewart and Brown (2009)	Fragile states	Consider that fragile states are those that are failing, or at risk of failing, with respect to authority, comprehensive service entitlements or legitimacy.	No reference is made to the theory of the state underlying the identification of these dimensions.	State failure is proxied by ethnic or civil war. The absolute service entitlement index combines child mortality, provision of clean water and primary school enrolment. Legitimacy failure is proxied by the level of democratic governance. In the last two dimensions, both absolute and progressive measures are considered. The analysis is based on the definition of thresholds for each indicator, which are then combined.	Provide lists of countries for each of the three dimensions, differentiating between failed states and countries at risk of failure.

Notes: Ordered alphabetically according to the reference.

combinations of these three dimensions, and "typical" countries are also identified. Still, in both cases it is not assumed that the obtained classification of fragile states is ordinal.

Some common features may be identified in terms of the contribution of the proposals in this group to the literature on fragile states. The first is their emphasis on providing some guidelines for assistance and intervention in these countries, especially in the case of Goldstone et al. (2003) and Call (2010). Secondly, there is an overall concern with the identification of the causal factors influencing and leading to state fragility (or failure in some of the cases). This is explicit in the case of Goldstone et al. (2003), but is also clear in both Call (2010) and Stewart and Brown (2009; 2010). Finally, and a virtue of these proposals, is a multidimensional approach to state fragility, and a recognition that it should not be considered as a binary phenomenon.

2.2.2. Proposals providing overall rankings of fragile states

I turn now to the proposals of overall rankings of countries derived from fragility indices, whose main characteristics are summarised in Table 2. I focus here on the most frequently used indices for the measurement of fragility and on those whose description specifically refers to this concept, namely: the Country Indicators for Foreign Policy (CIFP) Fragility Index, the aforementioned CPIA, the Fragile States Index, the Index of State Weakness in the Developing World, and the State Fragility Index. All the scores resulting from these proposals are continuous (except for the State Fragility Index), thus enabling a full ranking of countries. In most of them, rankings for each of the dimensions of fragility identified are also provided alongside the ranking of countries according to the overall score.

Due to their emphasis on elements of state performance as well as conflict indicators, other indices have also been considered as providing a measure of state fragility. These include the State Weakness Index, part of the Bertelsmann Transformation Index[12], the Global Peace Index, the Peace and Conflict Instability Ledger, the Political Instability Index, the indicators of Political Stability and Absence of Violence, part of the Worldwide Governance Indicators (Fabra Mata and Ziaja, 2009), and the Index for Risk Management (INFORM, 2017). I refer to Fabra Mata and Ziaja (2009), Ziaja and Fabra Mata (2010), Gutierrez et al. (2011) and Gutierrez Sanin (2011) for more extensive reviews.

[12] The State Weakness Index was not considered given that it is no longer provided as part of the Bertelsmann Transformation Index, which now only offers scores for the state of political and economic transformation as well as transformation management.

Table 2. Selected list of fragility indices

Institution (References)	*Index*	*Aim and Dimensions*	*Theoretical roots*	*Indicators and Methodology*	*Rankings*
Carleton University (Carment et al., 2006; Carment, Prest and Samy, 2009; Carment and Samy, 2012; CIFP, 2015)	CIFP Fragility Index	It assesses state performance along three dimensions of statehood – authority, legitimacy, and capacity (ALC).	The concept of authority draws on the Weberian definition of the state and is similar in some respects to Mann's (1984) [cited in Carment, Prest and Samy (2009, p.86)] definition of despotic power. The concept of legitimacy is based on Weber's definition of the state and on a number of assumptions about the characteristics of a legitimate state. The definition of capacity is similar to Migdal's (2001) [cited in Carment, Prest and Samy (2009, p.84)] in its focus on the state-society relation, though the authors follow the UNDP's broader understanding.	More than 70 indicators, measuring performance in governance, economics, security and crime, human development, demography, and environment. First, structural indicators are grouped and a composite index for country performance along those six categories is constructed. The results for each country are then averaged in each subject cluster (ALC).	The scale is 1-9 (low fragility to high fragility). Countries have scores for the different components of the ALC approach and an overall score. Overall fragility scores above 6.5 are considered serious.
World Bank (World Bank, 2011a; 2017b)	Country Policy and Institutional Assessment (CPIA)	It represents the quality of a country's present policy and institutional framework, in terms of how conducive it is to fostering poverty reduction, sustainable growth, and the effective use of development assistance. It is based on four dimensions: economic management, structural policies, policies for social inclusion/equity, and public sector management and institutions.	No detailed reference to the underlying framework is mentioned in the main documents.	16 criteria related to the four dimensions. For each dimension, countries are rated on a scale of 1 (low) to 6 (high). The rating process includes: i) a benchmarking phase, during which there is the rating of a small but representative sample of countries selected from all regions; and ii) a second phase, during which the remaining countries are rated using the scores from the benchmark countries as guideposts. Each of the four clusters weighs 25% of the overall score.	The scale is 1-6 (low to high). Fragile states are countries with a CPIA score of 3.2 or less. "Fragile Situations" either: a) have a harmonized average CPIA country rating of 3.2 or less, or b) had the presence of a UN and/or regional peace-keeping or peace-building mission during the past three years.
Fund for Peace; Foreign Policy journal (Fund for Peace and	Fragile states index (FSI)	Based on the collection of data on the existing social and economic, political and military pressures faced by each country, it allows the identification of the normal	The most common attributes of state fragility include "the loss of physical control of its territory or a monopoly on the legitimate use of force; the erosion of legitimate authority to	6 social and economic indicators and 6 political and military indicators, and more than 100 sub-indicators. The Conflict Assessment Software Tool attributes a score to each indicator	The scale is 1-120 (low fragility to high fragility). In the report countries are categorized by score quartiles: alert (90-120), warning

Table 2. Selected list of fragility indices

Institution (References)	Index	Aim and Dimensions	Theoretical roots	Indicators and Methodology	Rankings
Foreign Policy, 2014; 2015)		pressures that all states experience those pressures are pushing the state towards the edge of failure.	make collective decisions; an inability to provide reasonable public services; the inability to interact with other states as a full member of the international community", but no information is included to the underlying theory of state.	measuring the significance of the various pressures to the country. The overall assessment results from a triangulation of these results, quantitative analysis and a qualitative examination of the major events in the countries.	(60-90), stable (30-60), and sustainable (0-30).
Brookings Institution (Rice and Patrick, 2008)	Index of state weakness in the developing world (ISW)	It enables the identification of potential patterns of state weakness, either within geographical regions or across functional areas by capturing state performance across its four baskets of responsibility: economic, political, security and welfare.	It is argued that the definition of weak states considers what are commonly considered as the core functions of statehood.	20 indicators, with 5 indicators for each basket. Within each basket, the indicator scores are standardized and aggregated, creating individual indicator and basket scores ranging from 0.0 (worst) to 10.0 (best). The four basket scores are averaged to obtain an overall score for state weakness.	The scale is 0-10 (worse to best). Countries are classified as: "Failed states" (three weakest countries); "Critically weak states" (bottom rank quintile); "Weak states" (second rank quintile); and "States to watch" (those with a significantly low score in at least one dimension).
George Mason University (Marshall and Goldstone, 2007; Marshall and Cole, 2014a)	State fragility index (SFI)	It is a measure of state effectiveness and legitimacy in the key dimensions of security, governance, economics and social development, based on the idea that the state's ability to win the loyalty of its people depended on its performance in these spheres.	This rationale of this measure is related to the idea that, in order to achieve maximum stability, the state must exhibit both dimensions. The analysis of fragility is part of a global report that makes use of systems analysis to understand the links between governance, conflict and development, but no further detail is provided in relation to the fragility index.	8 indicators on effectiveness and legitimacy across the four dimensions. Each indicator is rated on a 4-point fragility scale, with the exception of the Economic Effectiveness indicator, which is rated on a 5-point fragility scale. These scores are then combined into a score for effectiveness and another for legitimacy. The overall index results from the sum of these two scores.	The scale is 0-25 (no fragility to extreme fragility). The overall index is the basis for a ranking of countries according to their score.

Notes: Ordered alphabetically by the index name.

The CPIA is indisputably the most widely used as an indicator of fragility. Initiated in the mid-1970s, the CPIA ratings were developed and used for allocation purposes, namely of the resources from the International Development Association (IDA). It evolved since its inception, undergoing a number of changes and adjustments over time. Currently the CPIA aims to assess how favourable the policy and institutional framework of a country is to the promotion of poverty reduction, sustainable growth, and the effective use of development assistance. For that purpose, it considers sixteen criteria grouped into four clusters: economic management, structural policies, policies for social inclusion and equity, and public sector management and institutions. Given its emphasis on policies and institutions, it provides an indication of state performance.

According to many academics and development organisations, this makes the index suitable as a measure of state fragility. It has been used by several organisations to define the group of fragile states. The World Bank considered the score 3.2 as a threshold below which countries would be classified, first, as "LICUS" (Low Income Countries Under Stress), and from 2009 onward as "fragile states". In 2011 the same institution adopted the designation of "fragile situations" for countries with either a harmonized average CPIA country rating of 3.2 or less, or the presence of a UN and/or regional peace-keeping or peace-building mission during the past three years (International Development Association, 2007; World Bank, 2017b)[13].

This index has also been used in some academic work on fragile and failing states. McGillivray (2006) and Feeny and McGillivray (2009) consider as fragile states those countries belonging to the bottom two quintiles of the CPIA or those not rated in the current CPIA rating exercise. Chauvet and Collier (2008) and Chauvet, Collier and Hoeffler (2010) adopt a cut-off level of 2.5 for the CPIA, defining failing states as those with a score below this threshold for at least four consecutive years. Bertocchi and Guerzoni (2010, 2012) consider two alternative definitions of fragility, both based on the CPIA. However, the rationale for using these particular thresholds is not explicitly explained by any of these institutions and authors.

More recently, several indices have been built with the specific aim of measuring state fragility. The institute Fund for Peace has proposed a Fragile States Index (FSI)[14], which is also published by the journal Foreign Policy. It is used to provide a ranking of countries, which are then categorised by score quartiles: alert (90-120), warning (60-

[13] The term "harmonized" refers to the averaging of the World Bank CPIA scores with those of the African Development Bank and Asian Development Bank.
[14] Previous to 2014, this index was designated Failed States Index.

90), stable (30-60), and sustainable (0-30). The Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD-DAC) uses it to build its list of fragile states, which results from the compilation of the list of countries based on the aforementioned harmonized average of the CPIA scores (from the World Bank, the Asian Development Bank and the African Development Bank), and the countries of the FSI which are in the "alert" and "warning" categories (see, for instance, OECD, 2012). Alongside the CPIA, this is also one of the indices considered for the list of fragile states used by DFID[15].

The Brookings Institution built the Index of State Weakness in the Developing World (ISW). It served as a basis to classify countries according to four categories: "failed states" (three weakest countries), "critically weak states" (those in the bottom rank quintile), "weak states" (those in the second rank quintile), and "states to watch" (states with a significantly low score in at least one of the four dimensions). However, the country rankings have only been published for the year 2008.

In line with their work on fragile states, the research centres at Carleton University and George Mason University also offer their own indices of fragility. Based on the conceptualisation of fragility developed by Carment, Prest and Samy (2009), the CIFP Fragility Index provides an overall score of fragility, as well as disaggregated scores for authority, legitimacy and capacity. This is the measure adopted by the Canadian agency for international development, CIDA. Researchers at George Mason University have built the State Fragility Index (SFI), rooted in Marshal and Goldstone's (2007) matrix of fragility, which serves as a basis for a ranking of countries.

Although less prominent in the debate of fragility, a few other indices are worth mentioning. First, I briefly introduce two additional indices that were not included in the previous paragraphs due to lack of information. Even if not publicly available, the United States Agency for International Development (USAID) has its own "Alert List" for Conflict and Instability, which ranks 160 countries in order of fragility, based on their internally built index (Bhuta, 2012b: 7). It is known that the underlying framework for this approach is provided by Goldstone et al. (2003), detailed above, and that the operationalisation of the concept is based upon the proposals in ARD (2005)[16], but no further details are provided. The second fragility index is the one underlying the

[15] DFID uses as a working definition of fragile states the following: "countries where the government cannot or will not deliver core state functions to the majority of its people, including the poor", and its list of fragile states draws on the CPIA, the Failed States Index of the Fund for Peace, and the Uppsala Conflict Database (ICAI, 2015: 2).
[16] See Bhuta (2012a, b) for a detailed critical analysis.

proposal of the Crisis State Research Centre. In *Meeting the Challenges of Crisis States* (Putzel and Di John, 2012: 18) reference is made to an aggregated index resulting from the variables included in their Monopoly of Violence, Administration and Territorial Reach (MAT) database. This database and the tools used in their quantitative analyses are described in detail elsewhere (Gutierrez et al., 2011), but with no specific description of this fragility index or its application.

Despite not frequently referred to in discussions of fragility indices, the State Failure Problem Set, disclosed annually by the Political Instability Task Force (PITF, previously State Failure Task Force), offers a dataset of internal wars and failures of governance which includes data since 1955 on four distinct types of state failure: revolutionary wars, ethnic wars, adverse regime changes, and genocides and politicides (Marshall, Gurr and Harff, 2015). This measure differs from the ones described in the previous paragraphs in its narrower focus on state collapse and conceptually different approach to state failure. Two of the included variables, namely "failure of state authority" and "collapse of democratic institutions", are more directly linked to the described concepts. The first refers to situations in which central state institutions are weakened to the point that authority or political order can no longer be maintained in significant parts of the territory (Marshall, Gurr and Harff, 2015a: 12). The latter applies to situations in which autocratic political institutions, through the use or threat of force, weaken or replace democratic or quasi-democratic institutions (Marshall, Gurr and Harff, 2015a: 13).

Finally, it is important to highlight the recent advances proposed in OECD's (2015) report *States of Fragility: Meeting post-2015 ambitions*. The recognition of the need to consider multidimensional approaches to state fragility along with a concern with designing a strategy for post-2015 led to the suggestion of a new framework for identifying fragile states. This is based on the disaggregation of fragility into five dimensions. Each dimension is proxied by an index that results from the average of three normalised indicators and is designed to measure goals drawn from Goal 16, which aims at promoting "peaceful and inclusive societies for sustainable development" (OECD, 2015: 19). They include the following fragility "lenses": peaceful and inclusive societies, access to justice, effective and accountable institutions, economic foundations, and resilience (OECD, 2015: 104).

The focus on different dimensions of state fragility is common among existing proposals, though from varied perspectives. Whereas some focus on the outcomes of state fragility in different aspects, such as social, economic or political dimensions, others focus on the performance of countries across state functions, such as capacity or legitimacy. I argue that the latter should inform the operationalisation of the concept in order to avoid confusing causes and consequences of state fragility. In the next section I examine their theoretical roots in more detail.

2.3. THEORETICAL UNDERPINNINGS OF EXISTING APPROACHES

As pointed out by Bhuta (2012b: 7), a key challenge of measuring state fragility is definitional. In fact, the fuzziness of the term and the broadness and vagueness of current definitions are frequently highlighted in critical appraisals.[17] Given the complexity and multidimensionality of state fragility, the discourse is frequently disconnected from the theoretical roots of the concept, which has also led to the use of inappropriate tools to understand it.[18]

The construction of an index should be based on a sound working definition of the concept. According to Goertz (2006), this implies the identification of the concept as employed in theoretical propositions, as well as its constitutive dimensions, which will finally be measured by appropriate indicators. A clear and grounded theoretical framework is essential to inform the operationalisation of the concept. Not only does it identify the dimensions of state fragility, which will in turn determine the indicators to be used, but it also establishes the relationships between these dimensions, which will indicate the suitable aggregation procedure to obtain the measurement tool.

Bearing in mind the complexity of the concept of state fragility, completing these steps can be particularly challenging. Existing proposals have been criticised by the lack of clarity in the explanation of their theoretical basis (Lambach, Johais and Bayer, 2015), namely, the underlying theory of the state, and by the fact that they overlook the distinction between symptoms, correlates and causes of fragility (Besley and Persson, 2011a; Gutierrez Sanin, 2011: 21).[19] To help assess the approaches described in the

[17] See Table A1.1 in Appendix A for a selected list of the definitions of fragile states within the donor community. For detailed reviews of existing definitions see Cammack et al. (2006), Bertoli and Ticci (2012) and Nay (2013).
[18] See Faust, Gravingholt and Ziaja (2015) for a discussion of the cognitive challenge associated with identifying the causes of state fragility and with finding suitable instruments to understand it.
[19] Besley and Persson (2011a) also highlight that a conceptualisation based on a sound theory will enable the distinction between endogenous and exogenous factors.

previous sections, and in light of the aforementioned framework, this section focuses on these two elements.

Apart from the CPIA, which was not specifically built as a measure of state fragility[20], existing proposals are based on a working definition of the concept. Common to these definitions is a focus on the performance of the state in what are perceived to be its core functions. However, there is some divergence in the identification of the key state functions, as well as the capabilities that the state needs to have in order to perform them. Current proposals can be divided broadly according to the latter element. I start by describing a group of definitions focusing on the effectiveness and legitimacy of the state as determinants of state strength (in opposition to fragility). The second group of definitions adopts a three-dimensional approach, which, with some variation, draws upon the concepts of authority, legitimacy and capacity.[21]

The first group of definitions establishes the different functions associated with statehood, and views the performance of the state in terms of its legitimacy and effectiveness. These two dimensions are used in the approach proposed by Goldstone et al. (2003), which is also used by USAID. According to these authors, the notion of fragile states encompasses, in different degrees, states that are "failing", "in failure", or "recovering from failure". States can fail in either of two senses: i) "in the functional sense of losing the dominant role in enforcing law and order in their territories"; and ii) "in the normative sense of failing at those tasks that we think states should do: enforce justice and protect minorities, provide the conditions for economic growth, cope with natural and humanitarian disasters" (Goldstone et al., 2003: 3). The authors develop a matrix intended to summarise the complexity of state capacity. This matrix is based on the assessment of four dimensions of state-society relations – political, economic, social, and security – in terms of effectiveness and legitimacy. According to Goldstone et al. (2003), the provision of minimal public services is considered as the bottom-line of effectiveness. Although the conceptualisation of these two dimensions is explored in detail, the underlying theoretical basis is not always explicit.

[20] For this reason, the analysis of this index is not included in this section.
[21] This list of proposals does not make claims of completeness. The selection was made on the basis of the aforementioned dimensions of state fragility, which appear to be the most common among existing frameworks. For other, more extensive, lists of dimensions, I refer to Ghani, Lockhart and Carnahan's (2005) framework based on ten functions for the modern sovereign state. Additionally, Kaplan (2014; 2015) has proposed to categorise fragile states (or "political orders", in the terminology of the author) around four types, based on their level of political fragmentation and government capacity.

Building upon this approach, Goldstone (2008) argues that, in order to remain stable, the state must possess the same two general qualities: i) effectiveness, which "reflects how well the state carries out state functions such as providing security, promoting economic growth, making law and policy, and delivering social services"; and ii) legitimacy, which "reflects whether state actions are perceived by elites and the population as 'just' or 'reasonable' in terms of prevailing social norms" (Goldstone, 2008: 285). According to the author, a state is prone to failure under changing circumstances if it exhibits only one of these qualities, whereas a failed state is neither effective nor legitimate. Through the adoption of an institutional approach, the author maps out different pathways of state failure, described in terms of various combinations of loss of the two aforementioned qualities. The recognition of the importance of institutions and incentives for the maintenance of stability is the only reference to the theoretical framework underlying this definition.

The approach described above is also followed by the Center for Systemic Peace. The matrix of fragility that forms the basis for their State Fragility Index assesses the country's performance in terms of effectiveness – "carry out the tasks expected of a competent government" – and legitimacy – "by being perceived as just and fair in the manner it carries out those tasks" – across the four dimensions mentioned above: security, political, economic and social (Marshall and Goldstone, 2007: 13-14). According to their definition, fragility is closely linked with the capacity of the state to "manage conflict; make and implement public policy; and deliver essential services" and also with "its systemic resilience in maintaining system coherence, cohesion, and quality of life; responding effectively to challenges and crises, and sustaining progressive development" (Marshall and Cole, 2014a: 51). The rationale provided for this approach is related with the recognition that "assessing a state's ability to win the loyalty of its people depended on its performance in multiple spheres, spanning governance, economic performance and opportunity, security, and delivery of social services" (Marshall and Goldstone, 2007: 13). However, there is some lack of clarity in terms of the theory used to justify this view of the stable state.

Despite less explicitly, Rice and Patrick (2008) draw upon related concepts. These authors use the designation of weak states, but describe similar characteristics. More specifically, state weakness is measured according to the effectiveness in:

> *"(…) fostering an environment conducive to sustainable and equitable economic growth; establishing and maintaining legitimate, transparent, and accountable political institutions; securing their populations from violent conflict and controlling*

their territory; and meeting the basic human needs for their population" (Rice and Patrick, 2008: 3).

These four elements are proxied by economic, political, security and social welfare indicators. According to Rice and Patrick (2008: 8), this definition is intended to capture the government responsibilities that are commonly considered as core state functions. However, the only allusion to a theoretical appraisal of these functions is a footnote referring to two previous volumes on the topic of state failure.[22]

The definitions in the second group provide a clearer description of the theoretical roots of the concepts used. With some variation, they focus on three dimensions associated with well-functioning states – authority, legitimacy and capacity –, and the essential functions are derived from them.

Carment et al. (2006) propose a definition of state fragility based on the assumption that "it is the presence or absence of a functional government that distinguishes functional from fragile and failed states" (Carment et al., 2006: 5). Fragility measures the extent to which the actual practices and capacities of the state for providing its basic functions differ from their ideal image, which is the one reified in both state theory and international law (Carment, Prest and Samy, 2009: 84). The authors argue that there are three fundamental properties which reflect the functions of a state and its component parts: i) authority, which refers to the "ability to enact binding legislation over its population" and "to provide a stable and secure environment"; ii) legitimacy, which reflects "the ability of a state to command public loyalty to the governing regime, and to generate domestic support for that government's legislation and policy"; and, finally, iii) capacity, which refers to "the power of a state to mobilize public resources towards productive ends" (Carment et al., 2006: 6-7). The identification of these elements is based on the determinants of state strength listed by Gurr (1986; 1980) [cited in Carment, Prest and Samy (2009: 83-84)], namely, capacity, legitimacy, and the integrative role of the state. The theoretical grounding for each of these three properties is described in more detail, namely with reference to the Weberian definition of the state.

Call (2010) proposes a disaggregated approach to the problems posed by failed and fragile states based on the analysis of gaps in three similar dimensions. The author argues that there is: i) a "legitimacy gap" where the rules regulating the exercise of

[22] Patrick (2007: 651) considers the same definition of state weakness and proposes a typology of seven categories of countries, from "endemically weak states" to "reform-minded governments", based not only on their current situation, but also on their trajectory.

power and the accumulation and distribution of wealth are rejected by a significant group of the state's political elites and society; ii) a "capacity gap" where the institutions of a state lack the capability to deliver minimal public goods and services to the population; and, finally, iii) a "security gap" where states do not provide minimal levels of security when confronted with organised armed groups (Call, 2010: 306-308).

By the same token, Gravingholt, Ziaja and Kreibaum's (2012; 2015) notion of state fragility is based on a vision of statehood as comprising three distinct, but interrelated, dimensions: authority, capacity and legitimacy. Although recognising the similarity with Carment et al.'s (2006) definition, their conceptualisation of these dimensions is closer to that of Call (2010). Each of them is based on a particular type of state-society relation, namely: i) authority refers to the control of violence by the state; ii) capacity concerns the provision of basic services to the citizens; and iii) legitimacy is linked with the acceptance, or refusal to accept, by the society, of the state's claim as the legitimate actor to set and enforce generally binding rules (Gravingholt, Ziaja and Kreibaum, 2015: 1290-1292). Even if referring to Call's (2010) work and describing the three dimensions, some have found their justification for the choice of these dimensions as lacking in detail (Lambach, Johais and Bayer, 2015: 1301).

Drawing upon a similar distinction between the dimensions of state fragility, Stewart and Brown (2009: 3) define fragile states "as states that are failing, or at risk of failing with respect to authority, comprehensive service entitlements or legitimacy". Although the core list of state functions remains similar to the previous approaches, there is a distinction in terms of the attributes of the state necessary to perform them. The authors consider comprehensive basic service provision instead of state capacity, as they argue that service failures may result from either lack of capacity or lack of will. In addition to that, Stewart and Brown (2009) introduce an additional element of distinction between actual failure and risk of failure. The criteria used to determine whether there is a failure in each of these dimensions is explained in more detail. The "authority" of the state is related to the protection from violence, whereas "legitimacy" is linked with elements such as the democratic character of the regime and the civil and political liberties. A comprehensive service provision includes health services, basic education, water and sanitation, basic transport and energy infrastructure, and reduction in income poverty. Still, unlike the aforementioned definitions, there is no explicit reference to the theoretical underpinnings of the proposed definition and the three dimensions it encompasses.

This overview indicates that, although there is a concern with clarifying the terms used in the definitions and with identifying relevant proxies, in most cases, there is no reference to the underlying theory of the state. Exceptions to this lack of clarity are Carment, Prest and Samy (2009), Call (2010) and Gravingholt, Ziaja and Kreibaum (2012; 2015), who dedicate more extensive sections to explaining the theoretical roots of the focus on authority, legitimacy and capacity. However, neither of these works allows for the distinction between symptoms and causes of state fragility, which, it is argued here, is essential for a better understanding of the complexity of this phenomenon.[23]

2.4. LIMITATIONS OF EXISTING APPROACHES

Having highlighted the caveats in the theoretical roots of most of the existing approaches, I focus now on the next level in the operationalisation of the concept, which involves the choice of indicators and the methodology to build the measurement tool.

Regarding the first group of proposals described in section 2.2, which, I recall here, offered no ranking or only partial rankings of countries, the main caveats relate to the thresholds employed to determine whether the country is fragile in a certain dimension. In the case of Goldstone et al. (2003), no justification is provided for the thresholds considered and for the indicators used to specify the warning signs identified for both failing and failed states. As pointed out in Gravingholt, Ziaja and Kreibaum (2012: 6), Call's (2010) categorisation of states assumes that there is a gap in a certain dimension if a country scores below the predefined threshold. However, this means that the definition of different thresholds could lead to different conclusions, and the implicit binary logic also fails to provide more details about the "midfield" of fragility (Gravingholt, Ziaja and Kreibaum, 2015: 1285). Stewart and Brown (2009) carefully describe the use of the indicators and the methodology behind the construction of the

[23] This discussion leaves out the definitions which, despite sharing the focus on state capacity and describing similar core functions of the state, turn the attention to resilience as the counterpart of fragility. More specifically, I refer to Ikpe's (2007) work, which is built upon capacity and resilience as the two dimensions of state fragility. According to the author, this model is based on Hirschman's Exit, Voice and Loyalty trilogy, used to describe the dynamics between the citizens and the state. Additionally, I mention Putzel and Di John (2012), who use four attributes of the state as the basis for a fragility to resilience spectrum. The authors state that this framework is rooted in "a coherent and well established theoretical tradition" (Putzel and Di John, 2012: 7), but no reference to earlier accounts could be found.

composite indices. Still, further discussion of the rationale for the applied thresholds is lacking, as well as more detail about the usefulness of this analytical framework for future analysis.

The second group of approaches was reliant on the use of indices to provide rankings of fragile states. Recent critical voices focusing on fragility indices have revealed several caveats of existing proposals (Fabra Mata and Ziaja, 2009; Gutierrez Sanin, 2011; Gutierrez et al., 2011; Ziaja, 2012).[24] On the basis of the extensive and competent work done in these studies and in other critical appraisals, in this section I provide a summary of the main limitations divided loosely according to three elements: i) the definition of the term; ii) the choice of indicators and the aggregation procedure; and, finally, iii) the interpretation and presentation of the obtained results. The main strengths and limitations of the five indices discussed in section 2.2.2 are summarised in Table 3, built by assembling the observations found in the relevant literature. Based on this overview, the argument is made that, even if some of the problems of existing measures of state fragility are intrinsic to the quantification of social science concepts, other limitations can be more easily addressed. Thus, despite the plethora of existing approaches, there is still room for new proposals attempting to overcome those caveats.

2.4.1. Definitional confusion

A problem frequently associated with social science concepts, which particularly applies to state fragility, is their "intrinsic ambiguity" (Gutierrez et al., 2011). It results from the fact that when defining these concepts, several proposals include "hedges", that is modifiers that express intensity or modality, as well as broad terms, which are equally complex (Gutierrez et al., 2011: 29). The use of these terms blurs the meaning of fragility rather than clarifying it. For instance, according to Gutierrez et al. (2011: 29), the definition of legitimacy presented in Carment et al. (2006: 7), mentioned in section 2.3, introduces a new source of ambiguity for the concept of fragility underlying the CIFP Fragility Index. Carment et al. (2006: 7) argue that "[s]tates in which the ruling regime

[24] Fabra Mata and Ziaja's (2009) *User's Guide on Measuring Fragility* includes a detailed catalogue and an assessment of eleven fragility and conflict indices. Gutierrez Sanin (2011) and Gutierrez et al. (2011) provide comprehensive appraisals of poor state performance indices, with a particular emphasis on state fragility indices. The former focuses on problems related to the definition, intrinsic ambiguity, and the issue of order, whereas the latter looks at technical aspects underlying the construction of existing indices. On a different account, Ziaja (2012) assesses the content validity of nine fragility indices.

Table 3. Strengths and limitations of existing state fragility indices

Index	*Strengths*	*Limitations*			*Sources*
		Definitional confusion	*Choice of indicators and aggregation procedure*	*Use and interpretation of the results*	
CIFP Fragility Index	- Rooted in a comprehensive theoretical framework. - Based on a multidimensional approach. Aggregated results are presented along with the scores for each dimension.	- There is some ambiguity in the applied definition of legitimacy (namely resulting from the conflation of internal and external types of legitimacy).	- When operationalising the concept, the distinction between the three dimensions is not as clear-cut as in their theoretical definition. - The comprehensive list of indicators does not facilitate the identification of priority sectors for policy making. - The disaggregate data below the level of the six categories are not provided, rendering it difficult to replicate the index.	- The list of country scores obtained with the index is not structured in any meaningful way.	Fabra Mata and Ziaja (2009: 48-49) Gravingholt, Ziaja and Kreibaum (2012: 3) Gutierrez et al. (2011: 29) Rice and Patrick (2008: 6)
CPIA	- It supposedly adequately captures the will and capacity of states. - If one considers that weak states' policies and institutions are the underlying roots of the features of fragility, then this proves to be an appropriate measure, as it is focused on the institutional and structural features of countries. This also means that this measure is conceptually independent of income levels and conflict.	- There is some mismatch between the World Bank's definition of fragility and its transformation into variables. - There is a heavy focus on economic dimensions of governance, but less emphasis on security, political and social aspects.	- It largely relies on expert judgement, which makes it more subjective. There is some room for ambiguity when one considers the questions used to collect information on the clusters, and its reliance on the respondent's perception of what he/she considers as a true picture. - It is not clear whether the weights attributed to each dimension are appropriate to define fragility.	- There is no clear justification for the threshold used to identify fragile states. This is particularly problematic when one considers countries close to the cut-off point. - Given that it results from an aggregate average of 16 different dimensions, a score below 3.2 may be obtained in several ways, thus disguising important differences between the countries. - It became clearer over time that there has been an increasing mismatch between the CPIA and specific instances of fragility.	Guillaumont and Guillaumont Jeanneney (2009: 6) Harttgen and Klasen (2013: 136) Fabra Mata and Ziaja (2009: 51) Baliamoune-Lutz and McGillivray (2008: 2, 8-9) Bhuta (2012a: 248) Patrick (2007: 649) Gutierrez et al. (2011: 26, 32-33) Rice and Patrick (2008: 6) Woolcock (2014: 1, 4)
Fragile States Index (FSI)	- The Conflict Assessment System Tool (CAST) processes information from over 12,000 international, regional and national media sources, thus	- It focuses almost exclusively on early warning and assessment of internal conflicts, thus disregarding other aspects of state weakness. - The meaning of fragility is excessively broad, leading to confusion between	- The method by which scores are attributed to the indicator is complex, not transparent and not replicable. In the application of CAST, there is some lack clarity underlying the Boolean search process. There is no	- The establishment of *ad hoc* cut-off points may be problematic. For instance, introducing the cut-off points at the quartiles of data rather than on the ranking based on the final score leads to different groups of countries	Baker (2007: 90-91) Fabra Mata and Ziaja (2009: 55) Gutierrez et al. (2011: 26-28, 30)

Table 3. Strengths and limitations of existing state fragility indices

Index	*Strengths*	*Limitations*			*Sources*
		Definitional confusion	*Choice of indicators and aggregation procedure*	*Use and interpretation of the results*	
	providing an innovative and serious approach. - Some praise its focus on conflict and insecurity as crucial aspects of state weakness.	causes and consequences. This is also reflected in a rather cumbersome set of chosen variables.	information about the steps underlying the process of review and reconciliation and some doubts have been raised about the suitability of the analysts to perform this task. - It should be taken into account that countries may be under- or over-represented in the media.	in the four categories of failed states considered.	Rice and Patrick (2008: 7) Goldstone (2008: 287) Call (2010: 316-317) Bhuta (2012b: 9-11)
Index of State Weakness in the Developing World (ISW)	- The use of a simple methodology enables an easy access to this index. - It is fairly transparent, especially comparing with other indices.		- After normalisation, it is not clear what the unit of analysis is, or how it can be interpreted, for instance in the context of a regression. An analysis of this index concludes that the normalisation changes the relative weights of each basket, and the basket procedure violates the condition of independence of irrelevant alternatives.		Fabra Mata and Ziaja (2009: 64) Gutierrez et al. (2011: 31)
State Fragility Index (SFI)	- It is technically robust. - It attempts to distinguish between two dimensions of fragility, effectiveness and legitimacy.	- There is some ambiguity in the conceptualisation of legitimacy, specifically for the case of political legitimacy. It is not clear how the items covered in this dimension are assessed, and how the scales are built and marked.	- In practice it is not clear-cut how to distinguish between indicators of effectiveness and legitimacy.	- The assigned scores are based on a narrow range of integers (0, 1, 2 or 3).	Fabra Mata and Ziaja (2009: 74) Call (2010: 316-317) Gutierrez et al. (2011: 30-31) Rice and Patrick (2008: 6)

Notes: Ordered alphabetically by the index name.

lacks either broad and voluntary domestic support or general recognition suffer a lack of legitimacy", which, in Gutierrez et al.'s (2011: 29) perspective mixes internal and external legitimacy, thus undermining the interpretation of the marks for this dimension.

Additionally, existing indices have also been accused of "conceptual stretching", which comprises lack of definition and the unwieldy choice of too many variables, leading to subjective and "noisy" results (Putzel and Di John, 2012: 17), and undermines the validity of the obtained instruments (Lambach, Johais and Bayer, 2015: 1300). To give an example, the ISW includes as a critical government responsibility "fostering an environment conducive to sustainable and equitable growth" (Rice and Patrick, 2008: 3); but, as highlighted by Gutierrez et al. (2011: 26), the terms "equitable" and "sustainable growth" are very open, and hard to fit in the theory of the state. As indicated above, this can lead to confusion between causes, correlates and consequences of fragility.

Finally, another criticism stems from the fact that some measurement efforts place the focus on only one or two of the core functions of statehood, disregarding other areas of state responsibility (Patrick, 2007: 649; Rice and Patrick, 2008: 7). This has been pointed out about the CPIA, which has been accused of a heavy reliance on economic components, giving less weight to security, political and social dimensions (Patrick, 2007: 649; Harttgen and Klasen, 2013: 136).

2.4.2. Choice of indicators and aggregation procedure

After identifying the dimensions of fragility, finding suitable indicators can also prove to be a particularly daunting mission. First, some of the concepts used in existing definitions are hard to observe (recall the example referring to the ISW highlighted above), which implies that the analysis will be limited to the use of available proxies.

Second, even if different in theory, some dimensions can be harder to distinguish in practice. This is the case of, for example, the three dimensions of the state – authority, legitimacy and capacity – considered in the CIFP Fragility Index, and of legitimacy and capacity in the SFI (Rice and Patrick, 2008: 6). In some cases, there is even a mismatch between the definition of fragility proposed and the variables included in the measure used. Gutierrez et al. (2011) illustrate this using the case of the World Bank's definition of fragile states and the CPIA (applied to identify them). The definition encompasses violent conflict as a dimension of state fragility, but no variable is included to account for it in the CPIA, whereas, although no reference is made to structural policies in the definition, they appear as a variable in the operationalisation of the concept (Gutierrez et al., 2011: 26).

The theoretical roots of the concept of fragility should also help to clarify the links between the different dimensions. A failure to take into consideration that these dimensions are interrelated can lead to the introduction of "hidden weights" during the aggregation procedure (Gutierrez Sanin, 2011: 24-25). This is also a point of weakness in existing approaches. Most of them fail to discuss the logical operators that link the different dimensions of the concept, leading to logical and operational misspecifications (Gutierrez Sanin, 2011: 24-25).

Additionally, the fact that there is no *numeraire*, given that each country lies in a space of many dimensions, implies that one is unable to compare and establish the order between the dimensions, i.e. they are incomparable unless one makes explicit which one is more important (Gutierrez Sanin, 2011: 31). Bearing this in mind, doubts have been raised about the suitability of the weights attributed to the different variables and dimensional clusters, especially when they are considered as contributing equally to the overall score. For instance, there is no discussion of the reasons behind the attribution of weights of the different dimensions included in the USAID index of fragility (Bhuta, 2012a: 270; 2012b: 16). Even the use of a weighted average as the aggregation function can be questioned as it presumes that there is a substitution rate between the variables. Harttgen and Klasen (2013: 136) raise doubts about whether the weights used in the construction of the CPIA are reasonable for defining fragility. According to Gutierrez et al. (2011), a change in the aggregation procedure of the CPIA leads to substantially different rankings. Ultimately, some highlight the loss, and even distortion, of information that results from assuming that fragility can be aggregated into a unidimensional measure (Gravingholt, Ziaja and Kreibaum, 2012). This is the case of the CPIA, the Fund for Peace FSI, and the ISW.

Finally, I describe two additional problems of existing approaches associated with the construction of the index, namely: i) the lack of transparency in the applied methodology; and ii) the quality of data and their availability.

The first aspect relates to an overall concern with the information disclosed about the methodology employed in the construction of the index. This is an important element for users to judge the suitability of the index (and how impartial it is) for a certain application, and to enable the understanding of the disaggregate components of the index and its replicability (Fabra Mata and Ziaja, 2009). Some authors state that, overall, there is lack of transparency in the metrics used to rank countries (Rice and Patrick, 2008: 7) as well as in the data sources (Patrick, 2007: 649). More specifically, doubts have been raised about the attribution of scores to each of the FSI indicators, with claims that the underlying method is complex, not transparent and not replicable (Rice and Patrick, 2008: 7; Bhuta, 2012b: 9).

The construction of fragility indices faces an inherent obstacle related to information availability, as the existing data are frequently of low quality, incomplete and ambiguous (Putzel and Di John, 2012: 17). In terms of the nature of the collected data, it has been argued that the main shortcomings of fragility indices include: i) the quality of the data based on expert assessments, which is frequently undermined by lack of information about the way opinions are gathered and aggregated, and about how experts are chosen; and the ii) ambiguity of the applied questionnaires (Gutierrez et al., 2011: 29). In reference to the USAID index of fragility, Bhuta (2012b: 13) highlights that it is difficult to know what underlying quality is being measured by subjective perception surveys used to build existing datasets. Some have raised doubts about the questions included in the questionnaire applied by the World Bank to obtain data for the construction of the CPIA clusters, as well as about the validity of relying on the respondent's perception of what he/she regards as the true picture (Baliamoune-Lutz and McGillivray, 2008: 8-9). Additionally, even if variables based on expert opinion avoid the problem of missing values, the same does not apply to a great portion of the variables used in these indices. Although some available imputation techniques have been employed, there is room for improvement (Gutierrez et al., 2011: 29).

2.4.3. Use and interpretation of obtained results

The final group of shortcomings is related to the outcomes obtained and the conclusions derived from the use of existing fragility indices. Firstly, the establishment of an *ad hoc* cut-off point to distinguish fragile from non-fragile countries has been extensively criticised. For instance, the use of the 3.2 threshold for the CPIA to derive the group of fragile states has been frequently questioned (Baliamoune-Lutz and McGillivray, 2008: 2; Woolcock, 2014: 1). Furthermore, it has two problematic implications. First, given the adopted aggregation methodology, there are many ways in which an average score below 3.2 can be obtained (Harttgen and Klasen, 2013: 136). Second, and related, this overlooks the differences between countries with scores approximate to the threshold level. Similar concerns apply when one considers the proposed rankings and categorisation of countries (Putzel and Di John, 2012: 17). Gutierrez et al. (2011: 30) demonstrate that, if one places cut-off points at the quartiles of the data obtained for the FSI instead of considering the overall score, the four categories of countries identified in this approach correspond to different groups of countries. By applying fuzzy transformations[25] to the 2005 CPIA scores, Baliamoune-Lutz and McGillivray (2008) obtain significantly different scores. This divergence leads them to conclude that some countries, and particularly those close to the border of a quintile or to a cut-off point, may be incorrectly classified.

A further limitation of some of the existing approaches is their tendency to provide recommendations that are generic in nature, thus failing to provide information about the changes or processes that should be set in place to respond to the existing challenges (Goldstone, 2008: 287; Call, 2010: 316-317). For instance, despite offering the scores obtained for the different indicators used to derive the final score, the analysis of the SFI does not provide much detail beyond the description of overall trends. A similar constraint is identified in the PITF approach (mentioned briefly in section 2.2.2), which, though drawing its conclusions from a large dataset, focuses on a limited number of predefined "types" of failure, thus undermining its applicability to policy (Carment, Prest and Samy, 2009: 83).

In a nutshell, existing proposals for the measurement of state fragility suffer from a significant number of limitations. Even if some are inherent to the difficulties associated with operationalising social science concepts, others stem from conceptual stretching and ambiguity, or from lack of clarity in their methodology and data usage, which can lead to conclusions that overlook the complexities of the concept.

2.5. CONCLUSION

The goal of this chapter has been to review the main limitations of current proposals to measure state fragility, focusing first on the theoretical underpinnings of existing definitions, and then on the problems undermining the operationalisation of the

[25] See Afful-Dadzie et al. (2014) for an application of a similar method in order to suggest a procedure for selecting fragile states based on the African Development Bank selection criteria.

concept, the construction of the measurement instruments and the interpretation of results. In so doing, some important caveats have been identified that can be overcome in future work. More specifically, most of the existing approaches are undermined by a lack of solid theoretical foundations, which leads to confusion between causes, symptoms and outcomes of state fragility.

One prominent aspect of some of the current approaches is their focus on different dimensions of state fragility. However, considering the rankings of countries based on fragility indices, they do not take into account this multidimensional character of the concept when operationalising it (particularly when it comes to the choice of the aggregation procedure). Recent views in the academic world warn of the fact that, by ranking countries according to a single aggregate measure of state fragility, these proposals overlook the heterogeneity among fragile states (Zulueta-Fulscher, 2014). The donor community moves in a similar direction, drawing attention to "the need for new approaches to assessing and monitoring fragility using metrics that do not reduce fragility measures to a single index but rather allow for tracking multiple (and potentially uncorrelated) dimensions" (OECD, 2015: 45). However, with the exception of the recent suggestions by Gravingholt, Ziaja and Kreibaum (2012; 2015) and OECD (2015), the call for departing from overall scores has yet to inform existing indices. This proves even more relevant when one considers that different types of fragility will require distinct forms of assistance. A better understanding of this differentiation is of crucial importance for policy decision-making.

Finally, a last remark is in order on the need to pursue better approaches to the measurement of state fragility. Despite the criticism it has been subject to, this chapter concurs to the view that the term still holds sway over the development lexicon. Given its complexity and underlying political aspects, there is a need to "tame the wickedness of the state fragility/failure problem set" (Brinkerhoff, 2014: 337) by adopting a term in common use while simultaneously examining the diversity of the phenomenon that it assembles (Gisselquist, 2015: 1272).

Bearing this in mind, the following chapter proposes an alternative measure of state fragility, which aims to overcome some of the problems identified in current approaches, namely the fact that, although some of the existing approaches are based on more thorough theoretical considerations, the foundations of others are weaker and deserve more clarity. A few recent efforts have been made to provide theoretical models of state fragility. For instance, focusing on late-century Africa, and referring to state failure, Bates (2008a, b) provides a model to determine the conditions for the prevalence of political order. It is argued that there is a state when there is an equilibrium resulting from the choices that characterise that political order, and the model derives the determinants of this equilibrium. Also, Besley and Persson (2011a) put forward a framework for analysing fragile states by exploring the origins of state fragility, and, more specifically, how different factors contribute to different types of fragile states. Both proposals offer useful starting points to derive hypotheses regarding the main causes of state fragility, and to distinguish them from what are its dimensions, or pathologies, using Besley and Persson's (2011a) terminology. The measurement instrument advanced in this thesis makes use of the latter. The reason for this choice and all the details of the construction of this alternative measure of state fragility are delineated in the following chapter.

CHAPTER 3. THE MULTIDIMENSIONALITY OF STATE FRAGILITY: MEASURING STATE INEFFECTIVENESS AND POLITICAL VIOLENCE

3.1. INTRODUCTION

As suggested in Chapter 2, despite the prominent position of the term in the international discourse, the definition of fragile states remains disconcertingly far from precise. Furthermore, the existing lists of fragile states, alongside the indices of failure and fragility, fail to provide a concerted view on the issue. The review in the previous chapter showed how fragility indices have been used by a distinct number of institutions, from development organisations (e.g. World Bank), to independent institutes (e.g. Fund for Peace), or universities (e.g. George Mason University). The methodologies diverge, as do the obtained lists and rankings of fragile states, leading to different, and sometimes conflicting, views and claims about state fragility. Additionally, it highlighted that the criticisms of the existing measures, especially those based on indices, are often related to the way the concept is operationalised, the steps involved in the construction of the measurement instrument, and to the interpretation and application of the obtained results.

Bearing this in mind, the present analysis seeks to contribute to an improved operationalisation of the concept of state fragility by: i) using a working definition of state fragility which is built on a clear conceptual framework that establishes the role of the state and how its performance is measured; and ii) applying statistical methods to investigate the existence of patterns among countries and to build an alternative measure.

As recently expressed by both the donor community (OECD, 2015) and academics (Zulueta-Fulscher, 2014; Gisselquist, 2015), a better understanding of state fragility requires unpacking the concept and examining its different dimensions. This is the starting point of this chapter. The proposal made here is in line with previous work taking multidimensionality into account when conceptualising and measuring state fragility (Gravingholt, Ziaja & Kreibaum, 2012, 2015; Lambach, Johais & Bayer, 2015). However, it departs from these approaches in that it considers state ineffectiveness and political violence as two dimensions of state fragility, and proposes a methodological approach to measure them separately. These dimensions are the two symptoms of state fragility identified by Besley and Persson (2011a), who provide a clear distinction between causes, symptoms and consequences. A preliminary analysis with cluster methods unravels the existence of patterns of countries according to these two dimensions, and further contributes to the argument that they should be considered separately. Principal component analysis is then used to obtain an index for each dimension, thus avoiding an arbitrary aggregation procedure.

The roadmap of this chapter is as follows. In section 3.2 the theoretical framework underlying the conceptualisation of state fragility is described, while section 3.3 gives more detail about the data and the methodology used. Sections 3.4 and 3.5 discuss the results obtained with cluster analysis and principal component analysis, respectively. Afterwards, in section 3.6 the results derived from the two methods are compared, and the scores obtained for the two indices are contrasted with existing approaches. Finally, section 3.7 concludes.

3.2. CONCEPTUALISING STATE FRAGILITY

Defining state fragility requires first considering the role of the state in society. The proposal in this article draws upon a view of the state similar to that in the approaches reviewed in Chapter 2. The normative standpoint and positive judgements described below serve as the basis to the conceptual framework that explains the importance of the state in society. Afterwards, I describe in more detail the working definition of state fragility used in this chapter.

3.2.1. The role of the state in society

Definitions of state abound and diverge according to different theoretical foundations. Weber's widely used concept of state explains it "as a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory" (cited in Di John, 2010: 12). Developing a theoretical framework which explains the importance of the state in society implies both a normative standpoint and positive judgements. I start by establishing my approach for the standard role of the state based on political economy theory, and later I use the theoretical model developed by Besley and Persson (2011a) to describe what the actual role of the state is.

a) Normative standpoint

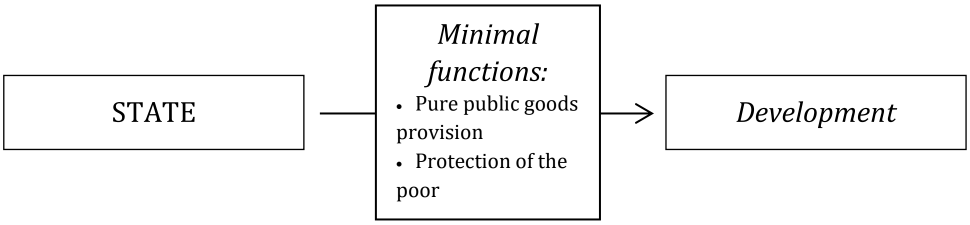
The role of the state has been approached from different perspectives and in different disciplines[26]. Given the aims of this research, I adopt a political economy view of the state. I consider that promoting economic development entails stimulating economic growth, but also involves a concern with improving welfare. This approach is aligned with the "post-Washington Consensus" view of economic development (Stiglitz, 1998; 2002). According to this line of thought, it is assumed that the economic role of the state is to address market failures, by supporting and complementing the market. In the presence of imperfect information or markets, it is argued that state interventions (even when the government shares the same imperfections of information) will promote markets' efficiency (Stiglitz, 2002: 219). Additionally, the existence of externalities creates situations of overproduction or underproduction of certain goods, leading to outcomes which are not efficient. This is the case of goods that are essentially public in nature, like defence, and of areas where markets simply fail to exist, such as the provision of funding for investment in human capital (Stiglitz, 2002: 222). Finally, markets are often not self-regulating, which creates a need for the state to assume the role of promoting economic stability.

In order to achieve this goal, the state must provide a set of public goods. Wolfensohn (1999) and Sen (1999) provide similar detailed lists. Stiglitz (2002: 218) highlights: i) the importance of providing high-quality education to all; ii) the provision of infrastructure, including the institutional infrastructure, and namely the legal system; iii) the regulation of the financial sector; and iv) the promotion of technology. Here I follow the framework proposed in the World Development Report (World Bank, 1997) which classifies the functions of the state as "minimal", "intermediate" and "activist" functions (World Bank, 1997: 27 – Table 1.1), according to the degree to which the activities require state intervention. For the present analysis, I consider the minimal functions of the state and, more specifically: i) the provision of pure public goods: defence, law and order, property rights, macroeconomic management, and public health; and ii) the protection of the poor (World Bank, 1997: 27). Furthermore, I concur with the view that complementing the market also implies ensuring social justice, in order to mitigate the situations in which the market leaves people with insufficient resources to survive (Stiglitz, 2002: 218). In this case, by ensuring that markets work in the way they

[26] See Milliken and Krause (2002) for a discussion of the evolution of statehood and a critical view of the state as the solution for the problem of political order, and Rotberg (2004) for a conceptualisation of nation-states.

are supposed to, the state provides a safety net for the poor. The overall framework is represented in Figure 1.

Figure 1. The normative standpoint on the role of the state in society



By adopting this view of the state, I align my proposal with what Hameiri (2007) has labelled as the "neo-Weberian institutionalist approaches", which "evaluate states in terms of institutional capacity and compare their performance to a Weberian ideal-type" (Hameiri, 2007: 133). This view, underlying many of the existing definitions of state fragility, has been accused of being intrinsically relational and normative, i.e. based on a comparison with an ideal performance of an effective, capable, legitimate, and stable state (Bertoli and Ticci, 2012: 216; Bhuta, 2012a: 236-237). Deviations from this epitome – usually the Weberian/Westphalian state – are associated with state weakness, fragility and failure.[27] However, some contend, this ideal state does not exist in reality beyond the most advanced industrialised countries (Milliken and Krause, 2002: 755; Boege et al., 2009; Nay, 2013: 332-333). Boas and Jennings (2005) provide a clear critical perspective:

> *"To say that something 'fails' or 'is failing' is a normative judgement that is only meaningful in comparison to something else; in this case, that something else is the existence of a Westernised, 'healthy' state that, unfortunately, has little relevance to most of the states in question because it has simply never existed there. Comparing a 'failing' state to mature states thus entails a neglect of history, demography, culture and economics, and their relationship to regional dynamics and patterns." (Boas and Jennings, 2005: 338)*

More recent studies have attempted to overcome these limitations by proposing new analytical frameworks for the definition of state fragility and failure[28]. For instance,

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[27] Nay (2013) argues that the three functions of the state identified in several of the described definitions – namely, authority, legitimacy and capacity – endorse an essentialist definition of political order, which is rooted in Western conceptions. More specifically, the concept of "authority" is based on Western political theory, the interest in "legitimacy" draws on Weberian conception of domination as well as liberal democratic theory, and "capacity" echoes Western donors' concern for managerial performance (Nay, 2013: 335).
[28] Bertoli and Ticci (2012) provide a review of these approaches.

Boege et al. (2009) argue that thinking in terms of hybrid political orders can bring new insights into how to prevent conflict and promote development. Frodin (2012) proposes the abandonment of the objectivist understanding of the state as a coherent and coercive entity, and promotes instead the idea of a "collective ability or inability to achieve governance to generate public goods and opportunities or to address common problems" (Frodin, 2012: 284). According to this view, one considers degrees and kinds of governance failures, depending on the different kinds of existing informal institutional orders. These accounts provide useful elements to improve the understanding of fragile states, especially because they underline the importance of considering the complexity of the relation between the state and society in light of the recent cases of state fragility and failure. Still, in the case of Boege et al. (2009) any theoretical exercise remains to be done. Also, Frodin (2012) does not provide an application of his proposed conceptualisation.

Despite recognizing the limitations of following the aforementioned approach, I find its theoretical premises useful as a starting point. Still, an approach based solely on a normative view of the state would fail to capture the dynamics between the state and society. Thus, I follow Besley and Persson's (2011a) theoretical model to complement this with positive considerations about the actual role of the state. It is my belief that the adoption of Besley and Persson's (2011a) theoretical model enables the examination of whether and why the actual role of the state deviates from the standard identified above (in which case there is an indication of state fragility). The performance of the functions identified will be dependent on state capacity as well as on state effectiveness. The latter differs from the first in that it corresponds not only to the ability of the state to perform the described functions, but is also dependent on the willingness of those in power to use that capacity to meet the demands of the society.[29] Besley and Persson's (2011a) two-period model of investments in state capacity and violence is thus applied in order to understand the state's decision-making process. I elaborate on this idea in the following paragraphs.

b) Positive judgments

Besley and Persson (2011a) explore the origins of state fragility by attempting to explain two pathologies of the state, namely state ineffectiveness and political violence. According to the authors, a peaceful state with high levels of state capacity will emerge

[29] This follows closely the approach in the World Development Report (World Bank, 1997: 3).

if institutions are sufficiently cohesive and there is a common interest in providing public goods. However, if this is not the case, then two pathologies of the state can emerge. There is: i) "*state ineffectiveness* in enforcing contracts, protecting property, providing public goods and raising revenues"; or ii) "*political violence* either in the form of repression or civil conflict"; or even iii) both pathologies are present at the same time (Besley and Persson, 2011a: 373).

I start by providing some formal discussion of the model, introducing the basic assumptions and equations used, in order to ground the hypotheses generated. Besley and Persson (2011a) consider two periods ($s = 1,2$) and divide the society into two groups: i) the Incumbent – the elements of society who hold the power (the state hereafter); and ii) the Opposition – those who have incentives to fight for power. In the first period, endowed with an initial level of state capacity (π_1 representing the initial level of fiscal capacity, and $\tau_1$representing the initial level of legal capacity), the state chooses: i) its policies (transfers r_s^I and r_s^O, and public goods provision g_s); ii) the investments in state capacity (legal and fiscal capacity, $\{\pi_2 - \pi_1, \tau_2 - \tau_1\}$) for the second period; and iii) the investment in violence (the means to hold on to power).

Between the two periods, there is a possibility of a transition in power, which will be dependent on the investments in violence by both the state and the opposition. In the first period, the opposition can mount an insurgency, with an army $L^O \leq \bar{L}^O$, with marginal cost ν, and paid within the group. The state can form an army $L^I \leq \bar{L}^I$, at marginal cost λ_1, but which is financed out of the government budget. The probability of a transition in power $\gamma(L^O, L^I, \xi)$ depends on the size of the armies, L^O and L^I, and on the advantage of the state over the opposition when considering the conflict technology ξ (i.e. the marginal gain from fighting).

The aforementioned choices are constrained by the budget available to the state, which comprises the revenues obtained through taxation $\tau_s\omega$, where ω represents individual income obtained through wages, as well as an additional source of revenue from natural resource ownership and foreign aid R. Thus, the government budget constraint is given by

$$R + \tau_s\omega = g_s + m_s + \frac{r_s^I + r_s^O}{2},$$

where m_s represents the cost of investing in fiscal capacity, legal capacity and violence in period s, and can be described as

$$m_s = \begin{cases} \mathcal{F}(\tau_2 - \tau_1) + \mathcal{L}(\pi_2 - \pi_1) + \omega(\pi_1)L^I & \text{if } s = 1, \\ 0 & \text{if } s = 2. \end{cases}$$

Finally, it is assumed that political institutions play a crucial role in constraining the state, and impose that, for every unit of transfers that it gives to its own group, the state must give a share σ (≤1) to the opposition. The parameter $\theta = \frac{\sigma}{1+\sigma} \in \left[0, \frac{1}{2}\right]$ is used for convenience, with a higher level representing more cohesive institutions.

The authors analyse a sub-game perfect equilibrium in policy, violence and state capacity investments separately. Starting with the state's decisions in terms of policy, optimal public spending choices are made in order to maximise its within-period payoff, given by

$$\alpha_s g_s + (1 - \tau_s)\omega(\pi_s) + r_s^I,$$

subject to $r_s^O \geq \sigma r_s^I$ and the government budget constraint. $\alpha_s \in \{\alpha_L, \alpha_H\}$ represents the stochastic value of public goods, where $\alpha_H > 2 > \alpha_L > 1$ and $\text{Prob}[\alpha_s = \alpha_H] = \phi$. The latter is used to derive the optimal level of transfers

$$r_s^J = \beta^J[R + \tau_s\omega(\pi_s) - g_s - m_s], \qquad \text{where } \beta^I = 2(1-\theta) \text{ and } \beta^O = 2\theta.$$

In terms of public goods provision, the following expression represents its optimal level.

$$G(\alpha_s, \tau_s) = \begin{cases} R + \tau_s\omega(\pi_s) - m_s & \text{if } \alpha_s \geq 2(1-\theta), \\ 0 & \text{otherwise}. \end{cases}$$

The decisions of investing in violence for the state and the opposition are based on the analysis of the chances of, respectively, remaining in, or obtaining power, against the cost of the investment.[30] The authors determine the Nash equilibrium in violence levels $\{\hat{L}^O, \hat{L}^I\}$ by maximizing the expected period-2 utility for each group. The first order conditions obtained represent the fact that the marginal benefit of investing in violence results from the increased probability of being in power in period 2, whereas the costs are the resources needed to finance this violence. These are used to characterise the obtained equilibrium and its dependence on certain parameters, but, first, the following observation is derived

$$[U^I(\tau_2, \pi_2) - U^O(\tau_2, \pi_2)] = \omega(\pi_1)2(1 - 2\theta)Z,$$

[30] Besley and Persson impose some restrictions on the conflict technology and assume that ξ increases the state's marginal return to fighting (in terms of the probability of holding power) at the same time as reducing the opposition's marginal return.

where Z is given by the following expression, and represents the benefit from holding office in terms of residual tax revenues relative to the opportunity cost of fighting determined by the wages in period 1:

$$Z = (1 - \phi)\left[\frac{R + \tau_2(\pi_2) - G(\alpha_L, \tau_2)}{\omega(\pi_1)}\right].$$

Two propositions are derived from the first order conditions. First, if institutions are sufficiently cohesive, or the demand for public goods is high enough, then neither group has an incentive to invest in political violence. However, if either of these conditions does not hold, there will be two threshold levels that will determine whether each group invests in violence or not. Formally, these two threshold levels are

$$Z^I(\theta, \phi, \xi) = -\frac{\lambda_1}{\gamma_I(0,0,\xi)(1-\phi)2(1-2\theta)} \quad \text{and} \quad Z^O(\theta, \phi, \xi) = -\frac{\nu}{\gamma_O(0,0,\xi)(1-\phi)2(1-2\theta)},$$

where $Z^I(\theta, \phi, \xi) < Z^O(\theta, \phi, \xi)$, and the conditions are as follows[31]

1. if $Z < Z^I$, there is peace with $\hat{L}^O = \hat{L}^I = 0$
2. if $Z \in [Z^I, Z^O]$, there is repression with $\hat{L}^I > \hat{L}^O = 0$,
3. if $Z > Z^O$, there is civil conflict with $\hat{L}^I, \hat{L}^O > 0$.

According to the first proposition, both the state and the opposition accept the peaceful allocation of power (i.e. the probability of a transition in power is $\gamma(L^O, L^I, \xi)$). In the second case, the government invests in violence but the opposition does not do the same, a situation labelled as repression. Finally, if the value of benefit from holding office is above the two thresholds, both groups will invest in violence, i.e. the opposition will mount an insurgency and the state will respond also with political violence, resulting in a civil war. In terms of the main parameters affecting this decision, the authors derive that: i) higher wages, $\omega(\pi_1)$, will increase the opportunity cost of fighting and, thus, reduce the likelihood of repression or civil war; ii) higher additional revenues from natural resources or foreign aid, R, increase the value of holding power and hence the investments in political violence, therefore increasing the likelihood of repression or civil war; iii) higher expected spending on common interest goods, due to higher ϕ, decreases the likelihood of repression or civil war; and, finally, iv) more cohesive institutions (higher θ) reduce the likelihood of repression or civil war.

[31] These conditions were amended in order to make the text description in the chapter consistent with the formulas included in Proposition 2 (Besley and Persson, 2011a: 381).

Since these three situations determine the investments in violence of both groups, they will also influence the equilibrium rate of political turnover. Formally, these are represented by the following expression, which allows the authors to derive some insights into how violence has an impact on investments in state capacity

$$\Gamma(Z,\nu,\xi)=\begin{cases}\gamma\left(\hat{L}^{O},\hat{L}^{I},\xi\right) & \text{if } Z>Z^{O}(\theta,\phi,\xi)\\ \gamma\left(0,\hat{L}^{I},\xi\right) & \text{if } Z^{O}(\theta,\phi,\xi)\geq Z>Z^{I}(\theta,\lambda_1,\xi)\\ \gamma(0,0,\xi) & \text{if } Z^{I}(\theta,\lambda_1,\xi)\geq Z\end{cases}.$$

These investments are determined simultaneously with the violence decisions, and are chosen in order to maximise the expected utility for the state in period 2. These decisions are greatly influenced by the expected value of public funds in the second period, given by the expression

$$E(\lambda_2;Z,\nu,\xi,\theta)=\phi\alpha_H+(1-\phi)E(\lambda_2|\alpha_L;Z,\nu,\xi,\theta),$$

where

$$E(\lambda_2|\alpha_L;Z,\nu,\xi,\theta)=\begin{cases}\alpha_L & \text{if } \alpha_L\geq 2(1-\theta),\\ 2\left[(1-\theta)\left(1-\Gamma(Z,\nu,\xi)\right)+\theta\Gamma(Z,\nu,\xi)\right] & \text{otherwise.}\end{cases}$$

Two conditions are imposed in order to determine them: i) cohesiveness, which requires that θ is close to ½; and ii) stability, which states that the expected value of public spending is above 1 when the previous condition fails and, as a consequence, spending falls on transfers when $\alpha_2=\alpha_L$. The model demonstrates the existence of three types of states, depending on these conditions: i) if cohesiveness holds or ϕ is close to 1, there is a common-interest state and there are investments in both legal and fiscal capacity; ii) if cohesiveness fails but stability holds, the state is redistributive with public revenues used to finance transfers when $\alpha_s=\alpha_L$, and there are investments in both kinds of state capacity; and, finally, iii) if both conditions fail, the state is weak, there is no incentive to invest in state capacity, and the level of investment in legal capacity is lower than in cases i) and ii). I provide more details about the intuition behind each of these cases.

In common-interest states, the existence of either of those conditions guarantees that all future marginal public revenues are allocated to public goods, and also the expected value of public funds in period 2 is high enough to make a positive marginal return to investment in fiscal capacity. The fact that institutions are cohesive means that it is hard to use public funds to serve private interests (or there is no interest in doing so), and thus this is a peaceful state as neither of the groups invests in violence.

In redistributive states, the state is relatively unconstrained by political institutions, which means that it can use public funds for its private use. It will still choose to invest in state capacity given that it is likely to stay in power, rather than because it is concerned with promoting the common good.

In weak states, given that there is no stability, there is no incentive for the state to invest in fiscal capacity. Additionally, as the cohesiveness condition fails and the probability of political turnover is high, it is likely that the investments in fiscal capacity will be redistributed for the private use of the other group when it gains power. Therefore, weak states are also associated with political violence.

Putting together the results obtained from the analysis of state decisions in the two periods, the authors demonstrate that the two pathologies of the state have common roots. I summarise the main dynamics of the model in Table 4, representing the four state decisions and the underlying criteria and exogenous determinants. As pointed out by Besley and Persson (2011a), this allows one to identify the exogenous and endogenous variables, a distinction which is also made clear in this table, with the state decisions represented in the first column being endogenous variables in the model.

Table 4. State decisions and underlying determinants

Decision	Criteria	Exogenous determinants
Public goods	Amount of revenue left after investment decisions, depending on the interest in common goods	Additional revenue Initial level of fiscal capacity Institutional cohesiveness Interest in common goods
Transfers	Amount of revenue left after investment decisions and expenditure in public goods, depending on the respective group	Additional revenue Initial level of fiscal capacity Institutional cohesiveness Interest in common goods
Investment in violence	Cost-benefit ratio considering the stakes of holding power	Interest in common goods Additional revenue Initial level of fiscal capacity Marginal costs of violence Violence technology Institutional cohesiveness
Investment in state capacity	Expected value of public funds in period 2, which is largely determined by the rate of political turnover	Interest in common goods Institutional cohesiveness (Additional revenue Initial level of fiscal capacity Marginal costs of violence Violence technology)

As highlighted in the table, according to the hypotheses established, Besley and Persson (2011a) conclude that parameters ϕ and θ are of particular importance. High levels of ϕ

and θ, reflecting, respectively, the presence of cohesive institutions and strong common interests, lead to high investments in fiscal and legal capacity, and to low levels of political violence. However, if the value of one or both of these parameters is low, then the outcome will be dependent on the remaining parameters, namely, the existence of additional revenues (R), the violence technology (ξ), and the marginal cost of investing in violence for the opposition (ν). Thus, according to the hypotheses in the model, the determinants of state fragility are: i) the strength of common interests; ii) the extent of cohesive institutions; iii) the amount of resource rents (or foreign aid); and iv) the technologies for organising and conducting violence (Besley and Persson, 2011a: 386).

The main outcome of the model is a matrix of the state space that distinguishes between different categories of state fragility, according to different combinations of the two symptoms and their underlying determinants. Table 5 represents an adapted version of Besley and Persson's (2011a) matrix.

Table 5. Different categories of state fragility

Political violence	State (in)effectiveness: Weak	Redistributive	Common interest
Peace	Low ϕ, θ, R	Low θ, R High ϕ	High θ, ϕ
Repression	Low θ, ϕ, ξ, R High ν	Low θ, ϕ, R High ν, ξ	N/A
Civil war	Low θ, ϕ, ξ, ν High R	Low θ, ϕ, ν High ξ, R	N/A

Source: Besley and Persson (2011a: 386, Table A1; 2011c: 233, Table 5.1) - adapted.

Weak states are characterised by weak common interests and non-cohesive institutions. In redistributive states, institutions are non-cohesive, though the extent of common interests varies. The costs of investing in violence for both the state and the opposition will determine whether there is peace, repression or civil war. A high degree of resource dependence (or, similarly, of foreign aid dependence) will increase the likelihood of a civil war rather than repression. Having described the general lines of Besley and Persson's (2011a) model[32], in the next subsections I further justify the approach taken here and introduce my working definition of state fragility.

[32] This same framework has been used by the authors to build a Pillars of Prosperity Index (Besley and Persson, 2011c: 310), which is used to order 150 countries. It results from averaging three outcome variables: i) state capacity, which includes fiscal and legal capacity; ii) political violence, either in the form of repression or civil war; and, finally, iii) income. Although the authors warn that the goal is simply to provide an empirical illustration of development clusters identified by their model (Besley and Persson, 2011c: 310), the analysis is limited in some aspects. Namely, the fact that the three outcomes are equally weighted, and also the use of

c) Besley and Persson (2011a) as the preferred approach

Besley and Persson's (2011a) framework is not unique in its focus on the role of institutions and political violence in explaining differences in economic performance across countries. Given their prominence in the theoretical literature, the following paragraphs offer a brief overview of the framework of analysis developed by North et al. (2013), Acemoglu and Robinson (2008, 2012), and, more recently, by Centeno et al. (2017). I then justify my choice of using Besley and Persson (2011a) as the approach for this thesis.

North, Wallis and Weingast's (2009) framework is developed around the concept of social orders, which are patterns of social organization that can be characterized by: i) the way in which the institutions that support the existence of these forms of organization originate in the society; ii) the way the access to these organizations is open or limited; and iii) the incentives created by these forms of organization. These elements are closely linked with the control of violence by the society.

According to the authors, *limited access orders* (LAO) discourage the use of violence by organizations (North et al., 2013). In functioning LAO, the privileged position of the members of the dominant coalition – i.e. economic, political, religious an educational leaders – create rents that ensure the cooperation between them and create organizations that enable the mobilization and redistribution of the goods and services produced by the population (North et al., 2013: 5). The dominant coalition is crucial in providing third-party enforcement for each of the member organizations and limits the possibility of others to start rival organizations – a key feature of LAO.

The concept of rents is central to their framework, as they make individual behaviour predictable (North et al., 2013: 6). If leaders do not cooperate, their rents will be reduced. Also, continual armed conflict is only avoided as long as the rents received under peace conditions are higher than those received by using violence. Thus, rents can limit violence only if they are reduced when violence breaks out; they provide the mechanism that keeps the possibility of violence in check.

income, identified as an outcome of the model, alongside the two pathologies of state fragility. The approach proposed here departs from this analysis by focusing only on the two symptoms of state fragility, as it is considered that income is not a symptom but rather a consequence of state fragility. Additionally, both the data used and the methodology applied also differ from the ones used by the authors. Besley and Persson have also tested several of the hypotheses obtained from the model – in the form presented here and in more extended versions – in some of their work (Besley and Persson, 2009, 2011b, c).

Considering a continuous spectrum of societies, North et al. (2013: 11-14) distinguish between three types of LAO: i) fragile LAO, where the dominant coalition can hardly sustain itself if facing internal and external violence and where all surviving organizations have violence capacity (e.g. Afghanistan, Congo, Dem. Rep.); ii) basic LAO, which have a well-established government, with whom elite privileges and organizations are often closely identified (e.g. Myanmar, North Korea); finally, iii) in mature LAO the dominant coalition supports organizations outside and within the government, but limits access to private organizations that the government allows and supports in order to limit competition and creates rents to sustain itself and prevent violence (e.g. China, India).

The authors distinguish LAO from *open access orders* (OAO), which characterize developed countries. They "are sustained by institutions that support open access and competition" and the government has a monopoly over the use of violence, which is consolidated only in military and police forces (North et al., 2013: 16). The transition from LAO to OAO is possible for a mature LAO and "begins when members of the dominant coalition find it in their interest to expand impersonal exchange and, therefore, incrementally increase access" (North et al., 2013: 17). This requires three doorstep conditions (North et al., 2013: 17): i) rule of law for elites; ii) support for perpetually lived elite organizations (including the state), both public and private; and iii) consolidated political control of the organizations with violence capacity. This framework enables the authors to explain economic and political development across developing countries, highlighting that limited access societies have historically moved back and forth along the continuum between the three types. However, they claim that that the transitions from LAO and OAO have happened relatively quickly and that none of them has been reversed (North et al., 2013: 19).

Acemoglu and Robinson (2008, 2012) argue that institutions – defined as "the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction" (North, 1990) – are the fundamental cause of economic growth. Their framework is centred on three main institutional characteristics – economic institutions, political power and political institutions. Economic institutions are determined by the collective choices of the society. If there is a conflict of interest over institutions, then the winner will be determined by the distribution of political power. The authors distinguish between *de jure* political power – the power that stems from the political institutions in the society – and *de facto* political power – which depends the ability of the group in question to solve its collective action problem as well as on the distribution of resources (Acemoglu and Robinson, 2008: 6-7). The political and economic system, the authors argue, is maintained by a combination of *de jure* and *de facto* political power, and, thus, changes in the political equilibrium can only be triggered by reforming both forms of political power (Acemoglu and Robinson, 2008: 14).

A central idea in their argument is that of persistence: political institutions and the distribution of resources are relatively slow-changing and persistent. Acemoglu and Robinson (2008: 7) identify two central mechanisms of persistence: i) those who hold political power will determine the evolution of political institutions and will, thus, choose to maintain institutions that guarantee their political power; ii) if there is an imbalance in the distribution of resources, this means that the richer group has more *de facto* political power relative to others, which will allow it to advocate for economic and political institutions that favour this position and, consequently, perpetuate the initial disparity. However, their framework also allows for the potential of change through "shocks" to the balance of *de facto* political power (Acemoglu and Robinson, 2008: 7).

Another important distinction made by these authors is between inclusive and extractive institutions. According to Acemoglu and Robinson (2012: 74-75), sustained economic growth can only be achieved with inclusive economic institutions, which secure private property, an unbiased system of law and the provision of public services, as well as permit the entry of new businesses and enable individuals to choose their careers. The state will play a central role as the enforcer of law and order, of private property and contracts, and as a key provider of public services (Acemoglu and Robinson, 2012: 75-76). Given the link between the two, in order to promote inclusive economic institutions, political institutions should also be inclusive, i.e. sufficiently centralised and pluralistic (Acemoglu and Robinson, 2012: 81).

The emergence of inclusive institutions will occur during critical junctures, when a combination of factors deteriorates the power position held by the elites, strengthens their opponents' position, and generates the incentives for building a pluralistic society (Acemoglu and Robinson, 2012: 332). An important corollary of this is that nations with extractive economic institutions supported by extractive political institutions that create obstacles to economic growth will fail (Acemoglu and Robinson, 2012: 83).

More recently, Centeno et al. (2017: 2) developed a framework to examine the state and its ability to fulfil a set of important goals, namely, the provision of legitimate order, the advancement of effective economic development and the promotion of social inclusion. Central to their argument is the distinction between the capacity and the performance of the state. The first refers to its organizational and bureaucratic ability to implement governing projects, whereas the second represents what it is actually able to achieve (Centeno et al., 2017: 3). The relationship between the two is mediated by politics, and, consequently, an understanding of the performance of the state requires examining both state capacity and political dynamics.

In order to avoid conflicting causes and outcomes, Centeno et al. (2017: 7-8) propose to distinguish between the origins of the state from its organizational capacity, which, in relation to the politics of deployment, will then affect the state's overall performance. The authors depart from the previous view of the origins of the state as a way to capture the gains from cooperation, but, in line with Acemoglu and Robinson (2008, 2012) and others, argue that institutions exhibit path dependence and originate at critical junctures.

The organizational capacity of the state is identified through four indicators: i) the resources required to fulfil its obligations; ii) its presence in the society; iii) the presence and training of the civil service; and iv) the institutional coherence (Centeno et al., 2017: 10). The deployment of this organizational capacity will then be dependent on two crucial inputs (Centeno et al., 2017: 11-12): i) the political coalitions, which encompass the political leadership of the state, the quality of the political institutions (namely, the political parties) and the coalitions established to support the state's projects; and ii) the balance of social forces, which considers how the broader society responds to the state.

Finally, the authors consider state performance according to: i) the maintenance of political order and the territorial reach of the state; ii) the level of economic development, which depends on the policies pursued; and iii) the ability of the state to be inclusive, promoting the wellbeing of the whole population (Centeno et al., 2017: 14).

Besley and Persson's (2011a) model can be linked with the three frameworks. In Acemoglu and Robinson's (2012) approach, growth failures are explained by bad institutions, which will then lead to poor policy choices. In other words, the state has the relevant knowledge to choose good policies, but lacks the will to pursue them (Besley and Persson, 2014: 930). In Besley and Persson's (2011a) model, governments may have the knowledge about, and the willingness to, implement good policies, but they lack the capacity to pursue them (Besley and Persson, 2014: 930). Both frameworks are similar in the importance they attribute to political institutions, which in Besley and Persson's (2011a) model are an important determinant of the investments in state capacity. Additionally, according to these authors, the effects of changes in exogenous conditions

– such as changes in geopolitical conditions (Besley and Persson, 2014: 943) – can trigger reforms towards cohesive institutions, an idea that is very much in line with what Acemoglu and Robinson (2012) refer to as "critical junctures".

By placing the focus on state capacity, Besley and Persson (2011a) align their approach with the work by Centeno et al. (2017), who, as explained above, make a very clear distinction between the organizational capacity of the state and its performance. Although both approaches draw attention to the multidimensionality of state capacity, the framework proposed by Besley and Persson (2011a) has the advantage of showing not only the complementarities between these dimensions, but also the link between state capacity and both income and political violence (Besley and Persson, 2014: 931).

Finally, Besley and Persson's (2011a) analysis of political violence has parallels to the approach offered by North et al. (2013). Both frameworks look at the dynamics that deter the use of violence, but, as pointed out by the authors, Besley and Persson's (2011a) analysis of political violence is embedded in a wider setting, which considers: i) government repression and civil war as alternative outcomes with common underlying causes; ii) the link between income and political violence as a two-way relationship; iii) the effects of economic, political and social forces on investments in state capacity and political violence; and iv) the effect that political instability caused by political violence can have on the investments on state capacity (Besley and Persson's, 2014: 931).

Overall, Besley and Persson's (2011a) approach has the virtue of combining the analyses of state capacity and political violence in a single framework, which is directly applied to understanding state fragility. Furthermore, it contributes to unpacking its complexity by enabling a clear distinction between causes, symptoms and consequences.

3.2.2. Defining state fragility

Despite the criticism received by the term, I concur with the view that defends its usefulness for the discourse (Bhuta, 2012b: 238; Brinkerhoff, 2014: 337). In the present analysis, when possible I will avoid using the term "fragile states" interchangeably with "state fragility" as I recognise that the first implies a defined group of countries, distinguishable from non-fragile states, whereas the second suggests a continuum in which countries may exhibit different degrees of state fragility. As argued by Carment, Prest and Samy (2008: 3), fragility is a matter of degree not kind, and "[w]hile some countries are in fact failing or failed, in general aspects of fragility can be identified in virtually all states". Thus, I depart from the "erroneous" understanding of fragility as an "either-or phenomenon" (Engberg-Pedersen, Andersen and Stepputat, 2008: 7).

In order to obtain a working definition of state fragility, I follow loosely the "three-level" framework proposed by Goertz (2006)[33]. According to the author, the "basic level" is "the concept as used in theoretical propositions" (Goertz, 2006: 6), and thus "state fragility" itself. Next is the "secondary level", which includes the constitutive dimensions of the basic level concept. Here, I follow Besley and Persson's (2011a) approach and use their two pathologies as representing the symptoms of state fragility: state ineffectiveness and political violence. If, in order to diagnose a disease, one considers the list of symptoms of the patient, I argue that the definition of state fragility should be based on these symptoms.

Of the two prototypical ways to build multidimensional concepts proposed by Goertz (2006), namely the necessary and sufficient condition structure and the family resemblance one, I opt for the latter. I consider that there is state fragility when the country exhibits one or both of the aforementioned symptoms; and the higher the level of these symptoms, the greater will be the degree of state fragility. The third level is the "indicator/data level", which comprises indicators of secondary level factors, and forms the basis for quantitative measures (Goertz, 2006: 7). More detail about the choice of indicators is provided in the next section.

When compared to the existing definitions described in Chapter 2, the one adopted here is built upon a similar view of the state. Even if placing the focus on state effectiveness and political violence, some parallels can be drawn with the proposals based on authority, legitimacy and capacity. Given the strength of the approach proposed by Carment, Prest and Samy (2009), I focus on their fragile states framework as the benchmark for comparison.

According to their conceptualisation, "authority captures the extent to which a state possesses the ability to enact binding legislation over a population, to exercise coercive force over its sovereign territory, to provide core public goods, and to provide a stable and secure environment to its citizens and communities" (Carment, Prest and Samy, 2009: 86). Thus, this dimension of the state, basically, captures security and government competence and effectiveness, or, more specifically, it encompasses the legal capacity

[33] In line with the approach in Lambach, Johais and Bayer (2015) for conceptualising state collapse.

and coercive force of the state, public goods provision, and the guarantee of stability and security.

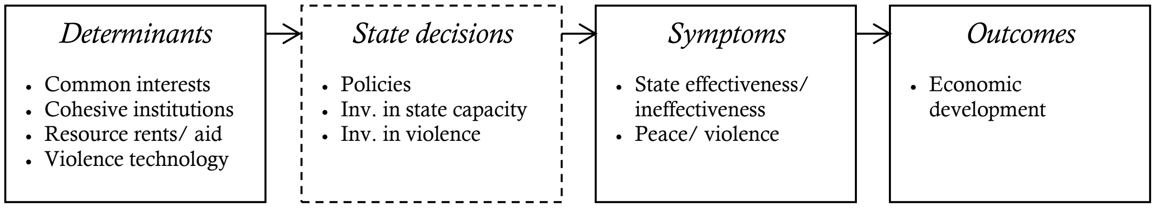
Regarding state capacity, Carment, Prest and Samy (2009: 87) refer to it as "the potential for a state to mobilize and employ resources towards productive ends". Based on an analysis of the state-society relations, this dimension of the state corresponds to an ideal and not to the actual ability. These definitions have some similarities with the dimensions encapsulated in Besley and Persson's (2011a) "state effectiveness" – namely enforcing contracts, protecting property, and providing public goods –, which is highly dependent upon the investments in state capacity (divided into legal and fiscal capacity).

Finally, legitimacy is defined by Carment, Prest and Samy (2009: 88) as "an expression of the ideational, rather than simply instrumental, loyalty that the governing regime commands with the population". The authors assume that this dimension can be proxied by considering the level of democracy, the protection of human rights, the extent of political rights and civil liberties, the treatment of disempowered populations, and environmentally sustainable policies (Carment, Prest and Samy, 2009: 88-89). This is harder to reconcile with Besley and Persson's (2011a) framework. Still, a link can be established with the importance that the cohesiveness of political institutions and the common interest in public goods assume in their model. The cohesiveness of political institutions captures checks and balances on the executive or the representation of electoral losers in election systems, whereas common interest in public goods refers to the use of public revenue in the common interest of both groups. They are important determinants of the decisions to invest in political violence, which, for the case of the opposition, partly reflect the legitimacy held by the state.

The departure from existing approaches and the adoption of Besley and Persson's (2011a) framework proves advantageous for a number of reasons. Firstly, it allows one to overcome the lack of theoretical rigour that undermines some of the existing contributions. Furthermore, Besley and Persson's (2011a) approach enables the differentiation between determinants, symptoms and outcomes of state fragility (as represented schematically in Figure 2), thus avoiding the conflation of causes and consequences made in previous approaches.

The empirical analysis included in this chapter is based on this theoretical framework, and aims at building an alternative measure of state fragility. The following section gives more detail about the data and methodology applied to pursue this goal.

Figure 2. State fragility: determinants, symptoms and outcomes



3.3. DATA AND METHODOLOGY

In this section, I provide more details about the data and methodology used for the empirical analysis carried out in the remainder of this chapter. The first subsection introduces the main variables used and provides some descriptive statistics, whereas the second explains the methods employed in sections 3.4 and 3.5, providing a rationale for their application.

3.3.1. Data

In order to operationalise the concept, and focusing now on Goertz's (2006) third level, I follow closely the elements provided in Besley and Persson's (2011a) description of the two symptoms of state fragility. The indicators listed in Table 6 were thus chosen to represent cues that reveal their presence, subject to data availability. The baseline dataset included raw data from different data sources for a total of 215 countries[34] for the period 1993-2012. These were selected as proxies for the different elements encompassed by the two symptoms of state fragility identified in the previous section[35], and based on data availability.[36]

[34] Table B1.1 in Appendix B1 includes the list of countries. Some territories and small islands were left out of the dataset due to limited information available for specific variables: Monserrat, Faeroe Islands, French Polynesia, Curacao, Isle of Man, St. Martin, Northern Mariana Islands and Sint Maarten.

[35] These elements can also be linked with the different categories of state fragility identified in the matrix in Table 5. This is obvious for the two types of political violence – repression and civil conflict. In terms of state ineffectiveness, weak and redistributive states may be empirically distinguished by analysing the balance between state revenues and the provision of public goods.

[36] Other variables have been considered for the analysis (e.g. indicator of infrastructure as a proxy for public goods provision), but the presented list was the preferred option, given that increasing the number of variables represents a trade-off in terms of the sample size. More specifically, the indicators 'executive constraints' (Polity IV) and 'checks and balances' (Keefer

Table 6. Variables used in the analysis

Symptom	Elements	Proxies
State (in)effectiveness	Contract enforcement	Rule of law Regulatory quality Enforcing contracts Independence of judiciary Control of corruption
	Protection of property	Property rights enforcement
	Public goods provision	Government effectiveness Public spending on education Public health expenditure Access to improved water
	Raising revenue	Tax revenue
	Authority	Failure of state authority
Political violence	Repression	Physical integrity Empowerment rights Political terror scale
	Civil conflict	Major episodes of civil violence Armed conflict Coups d'état Revolutionary wars Ethnic wars

The importance of distinguishing between *de facto* and *de jure* has been addressed in the institutional economics literature, especially in relation to the role of institutions in explaining cross-country differences in socio-economic outcomes (Foldvari, 2017: 759). According to this literature, institutions comprising official, formal rules are defined as *de jure*, whereas the ones that are enforced (usually reflected by practices and outcomes) are defined as *de facto* institutions (Foldvari, 2017: 759). The variables listed on Table 6 are all *de facto* measures, as they capture perceptions of how regulations work (e.g. rule of law and regulatory quality), measure how rules are enforced (e.g. property rights enforcement), or represent actual outcomes (e.g. public spending on education and health). There are some limitations of considering only *de facto* measures, namely the fact that by not considering *de jure* measures one fails to acknowledge that they are not all similar to each other everywhere (Voigt, 2013: 10).

and Stasavage, 2003; Keefer, 2013) were initially included as measures of the quality of political institutions. However, and in line with Besley and Persson (2011c), they were removed as they are considered to be proxies of the causes of state fragility, namely of institutional cohesion and common interests, respectively. Although a similar argument could be made about the variable 'rule of law', a narrower definition of the concept is adopted here. The list of variables considered follows closely the elements of state effectiveness and political violence comprised by their respective definitions.

However, in addition to the constraints on data availability mentioned above, this choice of indicators can be justified by the fact that Besley and Persson's (2011a) framework and definition of the two symptoms suggest the use of *de facto* measures. Furthermore, previous work has found an effect of the *de facto* measures on economic growth, but no effect when using *de jure* measures (e.g. Feld and Voigt, 2003, on judicial independence). Aditionally, some claim that there may be contadictions between *de jure* rules and *de facto* practices (e.g. Robinson, 2013, on land redistribution in the Trobriand-islands), especially in the last decades of the nineteenth century as globalization meant that the Western powers imposed expectations and directives on other countries directly, via colonization, and indirectly, via conditional aid on political or economic reforms (Foldvari, 2017: 762). Using only *de jure* measures could fail to capture these effects.

Table B1.2 in Appendix B1 includes more information about the variables used, namely their definitions, scales and ranges, and data sources. In general terms, with the exception of the variables for enforcing contracts and failure of state authority, higher levels of the variables in the first group will be associated with higher levels of state effectiveness, and thus, it is expected that they will be negatively related with state fragility. In terms of the variables used as proxies for political violence, with the exception of physical integrity and empowerment rights, it is expected that they will be positively related with state fragility.

Table 7 represents the summary statistics for the 20 variables. The number of observations indicates that some variables have a significant number of missing values, the most obvious example being enforcing contracts. It is also straightforward to observe the widely differing scales and magnitudes of the variables.

The correlation matrix (represented in Table B1.3 in Appendix B) provides some insights into the relationships among the different variables. Looking at one variable at a time, it is shown that there is a very high positive correlation between: i) rule of law and regulatory quality, control of corruption, property rights, and government effectiveness; ii) regulatory quality and control of corruption, property rights, and government effectiveness; iii) control of corruption and property rights, and government effectiveness; iv) property rights and government effectiveness; and v) empowerment rights an political terror scale. It can also be concluded that, among the variables with the lowest levels of correlation with other variables, enforcing contracts, failure of state authority, and coups d'état can be highlighted.

Table 7. Summary statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
Rule of law	2904	-0.011	0.998	-2.669	2.003
Regulatory quality	2841	-0.007	1.001	-2.675	2.247
Enforcing contracts	1566	620.607	305.068	120	1800
Independence judiciary	3591	1.085	0.803	0	2
Control of corruption	2847	-0.006	1.003	-2.057	2.586
Property rights	2832	48.716	24.025	0	95
Government effectiveness	2841	-0.007	1.003	-2.454	2.431
Education	2003	4.616	2.115	0	44.334
Health	3355	3.697	2.330	0.009	21.569
Access to water	3837	84.347	18.327	4.9	100
Tax revenue	2040	16.914	7.775	0.02	65.903
Failure of state authority	3340	0.100	0.572	0	4
Physical integrity	3300	4.938	2.294	0	8
Empowerment rights	3304	8.521	4.100	0	14
Political terror scale	3549	2.475	1.118	1	5
Episodes of civil violence	3360	0.529	1.431	0	10
Armed conflict	3480	0.206	0.589	0	7
Coups d'état	3340	0.030	0.190	0	2
Revolutionary wars	3340	-0.350	0.678	-0.5	4
Ethnic wars	3338	-0.208	0.876	-0.5	4

3.3.2. Methodology

The following sections provide the results obtained with two different methods used for multivariate statistical analysis: cluster analysis and principal component analysis (PCA). By applying cluster analysis, I hope to gain insight into how countries are grouped by similarities. Cluster analysis is used to partition data, grouping individuals that are "close" according to some appropriate criterion in order to form homogenous groups, which differ among each other as much as possible (Hardle and Simar, 2007: 271). This renders it a suitable method to compare different countries according to their degree of state fragility (following the line of work in Gravingholt, Ziaja and Kreibaum, 2012, 2015). Additionally, it does not require the pre-establishment of critical values for group parameters (Neack, 1993), which allows one to avoid using potentially arbitrary thresholds to classify fragile states.

Given the nature of the analysis, a hierarchical method of clustering will be applied, which starts with each object in an individual cluster and then continuously joins clusters together, until all objects belong to only one cluster (Cox, 2005: 87). From the different hierarchical methods, the Ward method was chosen, as it optimises the minimal variance within the clusters it produces, i.e. its objective is to join two clusters at each step in a way that minimises the variance for the joined clusters (Neack, 1993; Kronthaler, 2005).

The second method used is PCA. This is a procedure to reduce a set of highly correlated variables into a smaller number of components (groups of variables), minimising their correlation. Each of the obtained principal components is a linear combination of the original variables, and its variance indicates the amount of information conveyed (Afifi, Clark and May, 2004). Thus, the goal of reducing the number of variables describing state fragility without losing much of the information can be achieved by choosing to analyse only the first few principal components. An additional advantage of this method is that the obtained principal components are uncorrelated. Hence, this technique is applied in order to: i) investigate which elements of state fragility are more closely related with each other; and ii) reduce the number of dimensions of state fragility in a non-arbitrary procedure, and build an index for each dimension.

Factor analysis is usually presented as an alternative to PCA. However, the latter seems more appropriate given the aims of the analysis. Whereas factor analysis originates factors that are selected mainly to explain the interrelationships among the original variables, PCA provides a selection of a number of components that explain as much of the total variance as possible (Afifi, Clark and May, 2004: 391-392)[37].

3.4. CLUSTER ANALYSIS

This section describes the results obtained with the Ward cluster method. In order to fulfil the requirement of a balanced dataset, some changes were made to the original dataset[38]. The resulting sample includes data for 148 countries for 17 variables (enforcing contracts, education, and tax revenue were dropped). Following Neack (1993), I divide the full period 1993-2012, and apply cluster analysis over two 10-year periods.

[37] In fact, one of the methods for factor analysis is based on the rotation of the principal components obtained with PCA, a strategy that is pursued later (more detail below).

[38] First, the averages were taken in each period for each variable and country. Afterwards, countries with a number of missing values higher or equal to ten were dropped (as this meant that they had missing values for at least five variables for at least one of the periods). Then, the variables with 30 or more missing values were dropped: enforcing contracts, education, and tax revenue. Finally, countries with missing values were dropped. All variables were standardised.

3.4.1. Period 1993-2002

a) Determining the optimum number of clusters

In implementing cluster analysis, one first needs to choose the "true" number of clusters. One way to address this issue is to consider the Duda and Hart Je(2)/Je(1) index or the Calinski and Harabasz pseudo-F index. In both cases, larger values (and smaller pseudo T-squared values) indicate more distinct clustering (StataCorp., 2013). Table 8 represents the results for the stopping rules using each of the indices. The highest value for the Duda-Hart index corresponds to an optimal number of nine clusters, followed by two or four clusters, whereas the Calinski-Harabasz pseudo-F indicates an optimal number of two clusters.

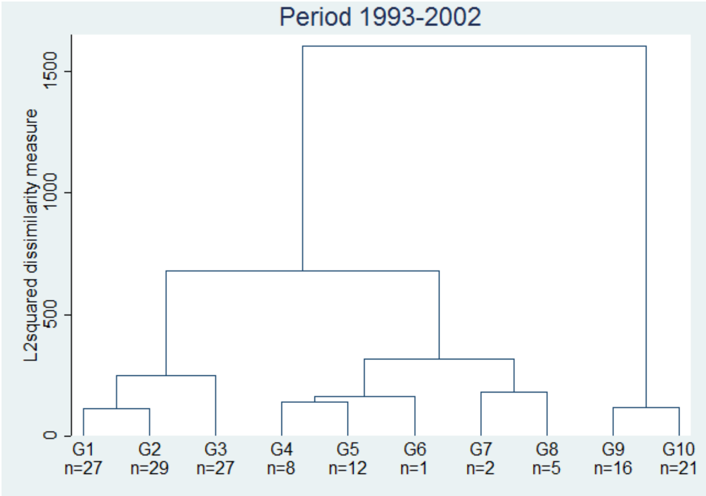
Table 8. Results for the Duda-Hart and Calinski-Harabasz indices, 1993-2002

Nr of clusters	Duda-Hart index		Calinski-Harabasz pseudo-F
	Je(2)/Je(1)	Pseudo T-squared	
1	0.6789	69.05	
2	**0.7827**	30.26	**69.05**
3	0.7570	8.34	60.96
4	**0.7785**	2304	52.14
5	0.5119	4.77	47.52
6	0.7346	6.87	43.84
7	0.6925	7.99	41.79
8	0.5614	27.34	40.29
9	**0.8040**	13.16	39.06
10	0.6792	12.75	38.44
11	0.7498	8.34	37.05
12	0.5383	2.57	36.13
13	0.7084	4.12	35.52
14	0.0000	.	34.82
15	0.4786	6.54	34.32

Notes: Highest values for each index highlighted in bold.

I use an additional heuristic procedure to choose the number of clusters. This consists of observing the dendrogram in order to detect any apparent clusters, and to compare it with the expectations based on what is known about the structure of the data (Neack, 1993: 350). The dendrogram is a visual illustration of the clusters, which continually branches from the top, with the final branches at the bottom leading to the objects that are being clustered (Cox, 2005: 87). It indicates the sequence of, and distance between, entities as they are clustered. The height of the vertical lines represents the strength of the clustering, with long vertical lines indicating that the groups represented by those lines are highly distinct from one another. Figure 3 depicts the dendrogram obtained by considering a cut number of 10 clusters.

Figure 3. Dendrogram for the cluster analysis, 1993-2002



Notes: Cluster analysis applying the agglomerative hierarchical Ward method. Cut number: 10. The numbers underneath each group indicate the number of countries.

If an analysis from the top to the bottom of the dendrogram is considered, there are two distinct opposing clusters, which correspond to the cluster including G9 and G10, and the cluster including groups G1 to G8. The groups in the latter are more similar to each other than to the joint group G9 and G10. However, it seems reasonable to consider at least three distinct groups within the first cluster: i) groups G1 to G3; ii) groups G4 to G6; iii) and groups G7 and G8. Considering the analysis from the bottom to the top of the dendrogram, groups G1-G2 and G9-G10 are the most similar and join together first in the branching diagram. These are followed by groups G4-G5, which are then joined with group G6. On the next level, group G7 joins G8, followed by the grouping of the cluster including G1-G2 with G3. Considering one level up, the group including G4, G5 and G6 joins with group G7-G8, forming three distinct clusters; and so on, until one unique cluster is obtained. The observation of the dendrogram seems to suggest the analysis with four clusters, an option that also corresponds to high values of the indices mentioned previously.

b) Final results

These four clusters correspond to the division of countries listed in Table 9, while Table 10 represents the means for each variable, considering the four different clusters.

Table 9. Resulting clusters of countries, 1993-2002

Cluster 1		Cluster 2	Cluster 3	Cluster 4
Albania	Slovak Rep.	Algeria	Angola	**Australia**
Argentina	South Africa	China	**Azerbaijan**	Austria
Armenia	Suriname	Colombia	Burundi	**Belgium**
Bahrain	Swaziland	Congo, Rep.	Congo, Dem. Rep.	Botswana
Bangladesh	Syrian Arab Rep.	Egypt	**Côte d'Ivoire**	Canada
Belarus	Tanzania	Guatemala	**Guinea-Bissau**	Chile
Benin	Togo	India	Sierra Leone	Costa Rica
Bolivia	Tunisia	**Indonesia**		Cyprus
Bosnia	Turkmenistan	Israel		Czech Republic
Brazil	Ukraine	Myanmar		Denmark
Bulgaria	United Arab Emirates	Nepal		Estonia
Burkina Faso	Uzbekistan	Pakistan		Finland
Cambodia	Venezuela	Peru		France
Cameroon	Vietnam	Philippines		Germany
Cape Verde	Yemen	**Russia**		Greece
Central African Rep.	Zambia	Rwanda		Hungary
Chad		Senegal		Ireland
Croatia		Sri Lanka		Italy
Cuba		Tajikistan		Japan
Djibouti		Turkey		Korea, Rep.
Dominican Rep.		**Uganda**		Lithuania
Ecuador				Luxembourg
El Salvador				Mauritius
Equatorial Guinea				Netherlands
Ethiopia				New Zealand
Fiji				Norway
Gabon				Portugal
Gambia				Singapore
Georgia				Slovenia
Ghana				Spain
Guinea				Sweden
Guyana				Switzerland
Haiti				Thailand
Honduras				Trinidad & Tobago
Iran				United Kingdom
Jamaica				**United States**
Jordan				Uruguay
Kazakhstan				
Kenya				
Kuwait				
Kyrgyz Rep.				
Lao				
Latvia				
Lebanon				
Lesotho				
Macedonia				
Madagascar				
Malawi				
Malaysia				
Mali				
Mauritania				
Mexico				
Moldova				
Mongolia				
Morocco				
Mozambique				
Namibia				
Nicaragua				
Niger				
Nigeria				
Oman				
Panama				
Papua New Guinea				
Paraguay				
Qatar				
Romania				
Saudi Arabia				

Notes: Typical countries highlighted in bold. Following Gravingholt, Ziaja and Kreibaum (2012: 13), the indicator of typicality is used to identify the countries that are more representative of each group. It is obtained by computing the sum of the squared differences of a country's scores in each variable from the respective medians of its group, standardised to a 0 to 1 scale. The more representative a country is of its cluster, the lower will be its score.

Table 10. Means by categories of the cluster analysis, 1993-2002

		1	2	3	4
State effectiveness	Rule of law	-0.5	-0.6	-1.5	1.2
	Regulatory quality	-0.4	-0.3	-1.3	1.2
	Independence judiciary	0.9	0.8	0.4	1.9
	Control of corruption	-0.5	-0.5	-1.1	1.4
	Property rights	43.4	45.9	28.3	79.2
	Gov. effectiveness	-0.4	-0.4	-1.3	1.3
	Health	2.8	2.1	1.6	5.1
	Access to water	75.9	78.8	57.3	98.2
	Failure state authority	0.0	0.0	1.4	0.0
Political violence	Physical integrity	4.9	2.1	2.5	6.9
	Empowerment rights	7.9	7.1	5.8	12.4
	Political terror scale	2.5	3.9	3.8	1.4
	Eps. civil violence	0.1	2.6	2.9	0.0
	Armed conflict	0.1	1.1	0.7	0.0
	Coups d'état	0.0	0.0	0.3	0.0
	Revolutionary wars	-0.5	0.3	0.8	-0.5
	Ethnic wars	-0.4	0.8	1.2	-0.5

There is a clear opposition between cluster 4 and clusters 2 and 3. Cluster 4 has: i) the highest mean values for the variables representing state effectiveness; ii) the lowest mean values for the variables representing repression; and iii) the values for variables representing civil conflict indicate that, on average, there were no conflict events in these countries. In contrast, cluster 3 has: i) the lowest mean values for the variables representing state effectiveness; and ii) high mean values for the variables representing civil conflict. In its turn, cluster 2 has most of the highest values for the variables representing repression, and also for armed conflict. Cluster 1 seems to be a more intermediate group. Comparing with the clusters 2 and 3, its mean values for the variables representing state effectiveness are higher than those of cluster 3, and roughly similar to the values for cluster 2. Its mean values for the variables representing repression and civil conflict are lower than those of these two clusters.

Following the proposal made by Gravingholt, Ziaja and Kreibaum (2012: 13), I use an indicator of typicality to identify the countries that are more representative of each group. This indicator is obtained by computing the sum of the squared differences of a country's scores in each variable from the respective medians of its group, standardised to a 0 to 1 scale. The more representative a country is of its cluster, the lower will be its score in the indicator. The most typical countries for cluster 3, with the lowest levels of state effectiveness and highest levels of civil conflict, are Azerbaijan, Cote d'Ivoire, and Guinea-Bissau. On the opposite extreme of the spectrum, Belgium, Australia and the United States feature as the most representative among the countries with highest levels of state effectiveness and with no conflict. Gabon, Ghana, and Bolivia are typical countries in cluster 1, which has low mean values in the indicators of state effectiveness. Typical countries for 2, characterised by higher mean values of the variables representing repression, include Uganda, Indonesia, and Russia.

3.4.2. Period 2003-2012

a) Determining the optimum number of clusters

A similar strategy was carried out for period 2003-2012. Table 11 represents the results for the stopping rules using the Duda and Hart Je(2)/Je(1) and the Calinski and Harabasz pseudo-F indices. The highest values for the Duda-Hart index correspond to three and four clusters, while two would be the optimal number of clusters considering the Calinski-Harabasz index. Again, I use the dendrogram as well to provide some indication of the ideal number of clusters to consider.

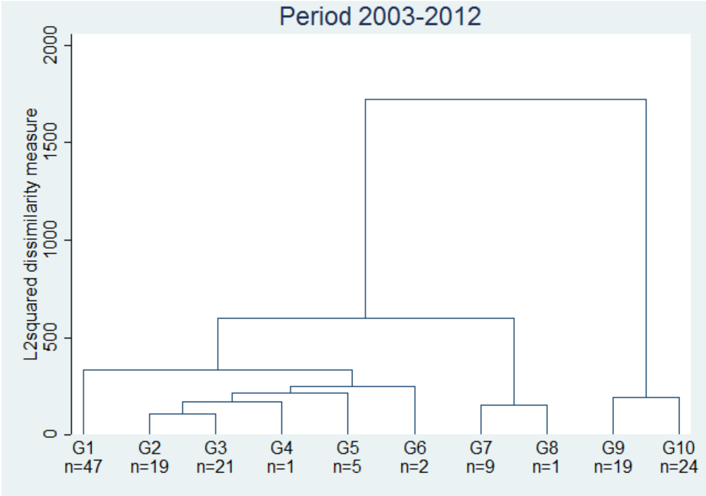
Table 11. Results for the Duda-Hart and Calinski-Harabasz indices, 2003-2012

Nr of clusters	Duda-Hart index		Calinski-Harabasz pseudo-F
	Je(2)/Je(1)	Pseudo T-squared	
1	0.6557	76.65	
2	**0.7905**	27.29	**76.65**
3	**0.8235**	19.94	62.80
4	**0.8015**	11.39	54.37
5	0.7772	12.61	49.57
6	0.5403	34.88	47.17
7	0.7415	13.59	46.13
8	0.5820	5.75	45.94
9	0.7756	10.99	46.35
10	0.5454	5.83	45.85
11	0.5425	18.56	45.55
12	0.7763	12.97	45.09
13	0.7228	6.52	44.56
14	0.4535	3.62	44.04
15	0.7150	7.57	43.42

Notes: Highest values for each index highlighted in bold.

The dendrogram represented in Figure 4 seems to suggest that there are three very distinct groups, although there is some heterogeneity within the groups, which could also be captured in smaller different subgroups. I opt for the first option.

Figure 4. Dendrogram for the cluster analysis, 2003-2012



Notes: Cluster analysis applying the agglomerative hierarchical Ward method. Cut number: 10. The numbers underneath each group indicate the number of countries.

b) Final results

The suggested three clusters correspond to the division of countries listed in Table 12, while Table 13 represents the mean values for each variable, considering the three different clusters.

Table 12. Resulting clusters of countries, 2003-2012

Cluster 1			Cluster 2	Cluster 3	
Albania	Ethiopia	Namibia	Congo, Dem. Rep.	Australia	**Portugal**
Algeria	Fiji	Nepal	India	Austria	Qatar
Angola	Gabon	Nicaragua	Israel	Bahrain	Singapore
Argentina	**Gambia**	Niger	Myanmar	Belgium	Slovak Republic
Armenia	Georgia	Nigeria	Pakistan	Botswana	Slovenia
Azerbaijan	Ghana	Panama	**Philippines**	Canada	Spain
Bangladesh	Guatemala	Papua New Guinea	**Russia**	Chile	Sweden
Belarus	Guinea	Paraguay	**Sri Lanka**	Costa Rica	Switzerland
Benin	Guinea-Bissau	Peru	Thailand	Cyprus	U. Arab Emirates
Bolivia	Guyana	Romania	Turkey	Czech Rep.	United Kingdom
Bosnia	Haiti	Rwanda		Denmark	United States
Brazil	**Honduras**	Saudi Arabia		Estonia	Uruguay
Bulgaria	Indonesia	Senegal		Finland	
Burkina Faso	Iran	Sierra Leone		France	
Burundi	Jamaica	South Africa		Germany	
Cambodia	Jordan	Suriname		Greece	
Cameroon	Kazakhstan	Swaziland		**Hungary**	
Cape Verde	Kenya	Syrian Arab Rep.		Ireland	
Central Afr. Rep.	Kyrgyz Rep.	Tajikistan		Italy	
Chad	Lao	Tanzania		**Japan**	
China	Lebanon	Togo		Korea, Rep.	
Colombia	Lesotho	Trinidad & Tobago		Kuwait	
Congo, Rep.	Macedonia	Tunisia		Latvia	
Côte d'Ivoire	Madagascar	Turkmenistan		Lithuania	
Croatia	Malawi	Uganda		Luxembourg	
Cuba	Mali	Ukraine		Malaysia	
Djibouti	Mauritania	Uzbekistan		Mauritius	
Dominican Rep.	Mexico	Venezuela		Netherlands	
Ecuador	Moldova	Vietnam		New Zealand	
Egypt	Mongolia	Yemen		Norway	
El Salvador	Morocco	Zambia		Oman	
Eq. Guinea	Mozambique				

Notes: Typical countries highlighted in bold. See Table 9 for details on the construction of the indicator of typicality.

Table 13. Means by categories of the cluster analysis, 2003-2012

		1	2	3
State effectiveness	Rule of law	-0.7	-0.4	1.2
	Regulatory quality	-0.5	-0.4	1.2
	Independence judiciary	0.6	0.7	1.7
	Control of corruption	-0.6	-0.6	1.2
	Property rights	32.2	37.5	73.7
	Gov. effectiveness	-0.6	-0.3	1.2
	Health	3.0	2.3	5.4
	Access to water	79.4	87.1	99.1
	Failure state authority	0.1	0.0	0.0
Political violence	Physical integrity	4.1	1.3	6.7
	Empowerment rights	7.1	5.0	10.6
	Political terror scale	2.8	4.1	1.5
	Eps. civil violence	0.2	3.4	0.0
	Armed conflict	0.1	1.5	0.0
	Coups d'état	0.0	0.1	0.0
	Revolutionary wars	-0.4	-0.2	-0.5
	Ethnic wars	-0.4	1.7	-0.5

Similarly to the results for period 1993-2002, there is a clear opposition between clusters; in this case, between cluster 3 and clusters 1 and 2. Cluster 3 has: i) the highest mean values for the variables representing state effectiveness; ii) the lowest mean values for the variables representing repression; and iii) and the values for variables representing civil conflict indicate that, on average, there were no conflict events in these countries. Overall, cluster 1 seems to represent the group of countries with lowest mean values for the variables representing state effectiveness. The distinction in terms of political violence is also clear, with cluster 2 including the countries with the highest values for the means of the variables representing repression and civil conflict.

For purposes of comparability with the results obtained for the period 1993-2002, the analysis was also carried out considering four clusters. The only difference was that the first cluster was divided into two clusters. Cluster 3 matched with cluster 2 in the analysis with three clusters, representing the countries with the highest mean values for the variables proxying for political violence, while cluster 4 was equal to cluster 3, and retained the same characteristics.

Equally to the analysis in the previous period, I use the same indicator of typicality to assess the degree to which each country is representative of its group. Typical examples in cluster 1, and thus representative of the countries with low mean values for state ineffectiveness, especially government effectiveness and political authority, are Gambia, Dominican Republic and Honduras. The typical countries in the group with the highest levels of civil conflict (cluster 2) include Sri Lanka and Russia alongside the Philippines. Finally, among the best performers are Portugal, Japan and Hungary.

By considering the main features of the different clusters regarding their levels in the two symptoms of state fragility, some insights can be gained in terms of the comparison between the two periods. Starting from one extreme, one observes no movements from clusters 2 or 3 in period 1993-2002 to cluster 3 in period 2003-2012, which would constitute the biggest improvement in terms of both state effectiveness and political violence. Still, several countries, including Bahrain, Kuwait and Malaysia, moved from cluster 1 in period 1993-2002, which was characterised by low levels of state effectiveness, to cluster 3 in period 2003-2012, thus demonstrating an improvement in this dimension. With one exception, all countries in cluster 3 in 1993-2002, characterised by the highest levels of state ineffectiveness and civil conflict, are part of cluster 1 in 2003-2012, which represents countries with a comparatively lower level of repression and political violence. Thus, this seems to represent some progress in terms of this dimension. The exception is the Democratic Republic of Congo which moved to cluster 2 in 2003-2012, thus improving its situation in terms of state effectiveness.

In the opposite direction, a movement to cluster 2 in period 2003-2012, which is characterised by the highest values of the variables representing civil conflict, can be interpreted as a deterioration in the situation of the country in terms of political violence. Thailand moved from cluster 4 in period 1993-2002, when it belonged to the group of countries with the highest levels of state effectiveness and lowest levels of political violence, to cluster 2 in period 2003-2012. The change of Trinidad and Tobago from the same cluster 4 in period 1993-2012 to cluster 1 in 2003-2012, which is characterised by low levels of state ineffectiveness, represents a worsening of the position of the country in terms of this dimension.

The analysis carried out in this section was exploratory and the inferences that can be derived are limited. Firstly, the number of clusters chosen in the beginning of the section partly determined the conclusions taken from the analysis. According to the results of the Duda-Hart index, the analysis provided here could have been based on the division of the countries into smaller groupings. In Gravingholt, Ziaja and Kreibaum (2012), the authors identify seven clusters of countries, offering a more disaggregated approach. However, given that the goal here was mainly to understand whether or not there was a rough clustering of countries according to the two symptoms of fragility, it is my belief that considering a smaller number of clusters proves to be a reasonable approach. Secondly, the conclusions derived from the characterisation of the obtained clusters should be taken with care given that they are based solely on the mean values of the variables included, with the limitations associated with that type of analysis.

Finally, it could be argued that the results would change if a different set of variables was used. In order to address this point, the present analysis was repeated considering different alternative variables, namely other proxies for the quality of political institutions (e.g. executive constraints) and for the level of repression in the country (civil liberties).[39] Overall, the results indicated that there was some variation in terms of the optimum number of clusters indicated by the tests, but the application of three or four clusters seemed reasonable in most cases. The distinction of a cluster of 'more fragile' countries was not clear in all of the hypotheses tested, neither was the differentiation between a cluster of 'more fragile' states in terms of state effectiveness and a cluster of 'more fragile' states in terms of political violence. However, the cluster of 'less fragile' states was clearly observed in all of the hypotheses tested, and overall the lists of countries belonging to the 'most fragile' and 'least fragile' clusters were roughly the same across the alternatives tested.

In spite of this, some conclusions can be drawn based on the analysis presented here. The clusters obtained for both periods seem to suggest that there is a group of countries that can be distinguished from the others by its higher levels of state effectiveness and lower levels of political violence. However, the mean values represented in Tables 10 and 13 show some heterogeneity among the remaining countries, which precludes their characterisation as a single group of 'fragile states'. Additionally, when comparing the clusters obtained for the two periods, it seems that in the period 1993-2002 a group of 'more fragile' states can be more clearly identified. The countries in cluster 3 are characterised by some of the lowest levels in state effectiveness and the highest levels in terms of political violence. However, in the second period this distinction is not as clear-cut. Cluster 1 seems to represent countries with the lowest levels of state effectiveness, whereas cluster 2 gathers the countries with the highest mean values for political violence. Thus, I argue that examining fragile states from a unidimensional perspective has some limitations. Instead, it proves more useful to consider the two symptoms of state fragility separately.

This concurs to the argument that state fragility should not be regarded as a dichotomy: there is no clear division between fragile and non-fragile states. Additionally, it corroborates the inference made by Gravingholt, Ziaja and Kreibaum (2012: 13) that a multidimensional concept such as fragility would not be appropriately measured by a one-dimensional index score. As highlighted in the previous paragraphs, the resulting

[39] Appendix B2 describes and summarises the main conclusions from the alternatives tested.

clusters show diverse performances across the indicators for the two dimensions. However, and considering broadly the two symptoms, it is not possible to determine how much one dimension could compensate for the other (Gravingholt, Ziaja and Kreibaum, 2012: 14). Cluster analysis allows one to take some steps further in the identification of non-comparable groups. Still, the results also seem to indicate that further empirical analysis considering a disaggregated approach to the two symptoms of state fragility may shed light into the understanding of state fragility. The following subsection further contributes to this argument.

3.5. PRINCIPAL COMPONENT ANALYSIS

3.5.1. Preliminary analysis: exploratory analysis of sample adequacy

The initial baseline dataset for the period 1993-2012 was considered, and an exploratory analysis was made to assess sample adequacy. Firstly, an exploratory analysis was held to determine the adequacy of the sample, using three criteria: i) a scale for the sample size proposed in Comrey and Lee (1992: 127); ii) the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy; and, finally, iii) the value of Rho, indicating the percentage of the total variance that is explained by the retained principal components.

Comrey and Lee (1992: 217) propose the following scale for determining the adequacy of the sample size: 50 – very poor; 100 – poor; 200 – fair; 300 – good; 500 – very good; and 1000 or more – excellent. Others have proposed that, considering the variable:factor ratio, a minimum of 1:5 should be required, the ideal being a ratio of 1:20. So, in the present analysis, the aim is to obtain at least 100 observations, the ideal being around 400 observations. The second criterion used to determine whether the sample is appropriate is the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. This measure ranges from 0 to 1, with small values indicating that overall there is too little in common between the variables to permit a PCA analysis. A scale is proposed to assess the results: between 0.00 and 0.49, “unacceptable”; between 0.50 and 0.59, “miserable”; between 0.60 and 0.69, “mediocre”; between 0.70 and 0.79, “middling”; between 0.80 and 0.89, “meritorious”; and between 0.90 and 1.00, “marvellous” (StataCorp., 2013). Thus, the aim is to obtain a minimum value of 0.5. Finally, the value of Rho, indicating the percentage of the total variance that is explained by the retained principal components, will also be used as an indicator of the appropriateness of the analysis.

Table 14 represents the results for different sets of analyses, considering the insights into the data obtained previously. A command was used to apply the Kaiser-Guttman criterion and only the principal components with eigenvalues greater than 1 were retained. The idea behind this rule is that any principal component with variance less than 1 contains less information than one of the original variables, and thus should not be retained (Jolliffe, 2002: 114).

Table 14. Exploratory analysis of sample adequacy

Description of different analyses	Obs.	Nr comps.	Rho	KMO
A. All variables	595	5	0.767	0.887
Low KMO				
B. Drop revolutionary wars	595	4	0.735	0.906
Low correlations				
C1. Drop enforcing contracts	876	4	0.728	0.894
C2. Drop failure state authority	595	4	0.746	0.890
C3. Drop coups d'état	595	4	0.748	0.888
Low number of observations				
D1. Drop education	827	4	0.710	0.897
D2. Drop tax revenue	749	4	0.719	0.889
D3. Drop enf. contracts, education and tax revenue	1857	3	0.683	0.888

Initially, all the variables were considered. The values are represented in the first line of the table. Both the number of observations and the value for Rho indicate that this sample size is appropriate, and the value of the KMO measure means that the sample is "meritorious". A few more options were tested. Given that revolutionary wars had the lowest score in the KMO measure in the previous analysis, this variable was dropped from the dataset. Even though, according to the KMO scale, the sample is now "marvellous", the number of observations remained the same. The percentage of the total variance explained is lower, but this results solely from the fact that the number of retained components is four instead of five. Thus, no significant improvements were obtained from this change.

One of the assumptions of PCA is factorability, i.e. there should be at least some correlation amongst the variables. Given that the analysis of the correlation matrix held in section 3.3.1 indicated that, alongside enforcing contracts, failure of state authority and coups d'état had the lowest levels of correlation with other variables, the following set of alternative analyses consists of dropping each of these variables at a time. Compared to option A, dropping enforcing contracts leads to an increase in the number of observations and in the KMO value. The obtained results for options C2 and C3 showed no significant improvements when compared to option C1, and thus I retain this as a hypothesis.

Additionally, I consider the variables with the lowest number of observations, namely enforcing contracts, education and tax revenue. The option of dropping the first of these variables has already been analysed, so I focus on the latter two (options D1 and D2). There was an increase in the number of observations and also in the KMO measure when compared to the initial analysis with all variables, especially in the case of option D1. Still, when compared to the dataset without enforcing contracts, the sample is still smaller in this option, and the KMO value is not significantly higher. In light of these conclusions, alternative C1 remains the preferred option.

Bearing in mind the analysis in section 3.4 of this chapter, I perform the analysis with the dataset obtained after dropping the three variables with the lowest number of observations. The results are presented in line D3. The increase in the number of observations is noticeable, even though the value for the KMO measure remains similar to those obtained with other alternatives. Despite the reduction in the Rho value, as highlighted before, this is simply related to the fact that the number of retained components is now three instead of four compared to previous alternatives, or five, in the case of the dataset with all variables. It is important to highlight that the main goal of this preliminary analysis is to guarantee that the sample size is adequate for further empirical exercises, and thus one should not be limited by small changes in the indicators chosen. Therefore, and in order to maximise the number of observations and to keep consistency with the samples considered in the previous section, I opt to consider alternative D3 as the preferred option from this preliminary analysis.

3.5.2 Results from non-rotated analysis

a) Determining the number of retained components

The analysis was carried out using the standard method of PCA. Given that PCA is not scale invariant and that the variables included in the dataset differ greatly in their ranges and scales, the correlation matrix is preferred to the covariance matrix in order to treat all variables on an equal basis[40].

[40] Applying PCA to ordinal variables may be problematic because they violate the assumption underlying the "classic" formulation of this method that at least normality is a reasonable distributional approximation for input variables (Kolenikov and Angeles, 2009: 134). Despite acknowledging this limitation, PCA has been extensively used with this type of variables, namely by Filmer and Pritchett (1980) when building an asset index based on household surveys.

One of the decisions embedded in the application of the PCA is the number of components to interpret. This was determined by two exploratory procedures. The first was based on the Kaiser-Guttman criterion, according to which one should retain the components with eigenvalues (estimated variances of the principal components) over 1. The results indicated that three principal components, with eigenvalues greater than 1, would be retained. Table 15 shows the eigenvalues of the correlation matrix, ordered from smallest to largest, and the proportion of the overall variance explained by each component (only the information about the retained three principal components is represented).

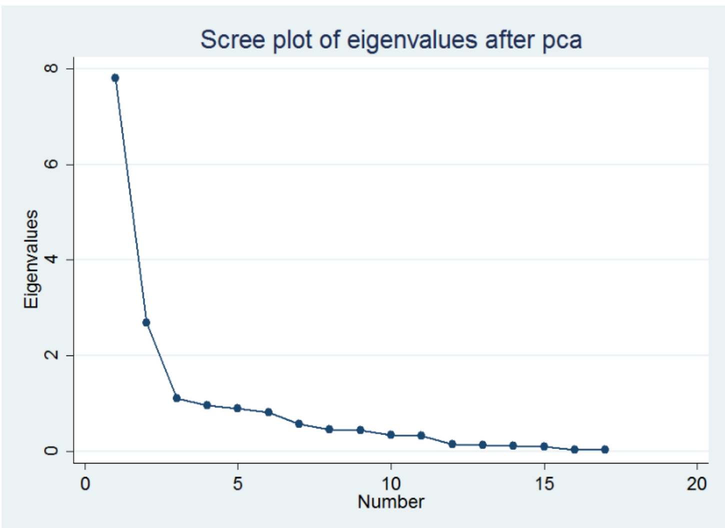
Table 15. Eigenvalues obtained with PCA, non-rotated analysis

Nr observations	1857
Nr components	3
Trace	17
Rho	0.6827

Component	Eigenvalue	Proportion	Cumulative
Comp1	7.80089	0.4589	0.4589
Comp2	2.69012	0.1582	0.6171
Comp3	1.11479	0.0656	0.6827

The second procedure consists in the observation of the scree plot to check the choice regarding the number of principal components retained. The scree plot represents the number of principal components on the horizontal axis versus the individual eigenvalues. The idea is to consider the number of principal components that corresponds to a cutoff point where, at the left, lines are relatively steep and, at the right, lines are relatively flat. In line with the Kaiser-Guttman criterion, the scree plot in Figure 5 seems to suggest the cutoff point in number three.

Figure 5. Scree plot, non-rotated analysis



b) Final results

The principal components (eigenvectors) are represented in Table 16. Given that the analysis considers the correlation matrix, the variables are standardised to have unit variance. Each loading represents the correlation between a component and a variable. The first component can be said to represent state effectiveness, with a focus on the legal system. The variables with the highest correlation with component two are major episodes of civil violence, armed conflict and ethnic wars. Thus, it can be interpreted as an indicator of political violence. The third components is mostly correlated with the variables representing the failure of state authority and coups d'état.

Table 16. Principal components (eigenvectors), non-rotated analysis

Variable	Comp1	Comp2	Comp3
Rule of law	**0.3326**	0.1549	-0.0420
Regulatory quality	**0.3234**	0.1446	0.0073
Independence judiciary	0.2751	0.1311	0.1390
Control of corruption	**0.3271**	0.1382	-0.0018
Property rights	**0.3053**	0.1797	0.0421
Gov. effectiveness	**0.3262**	0.1711	-0.0480
Health	0.2675	0.0335	0.0171
Access to water	0.2228	0.1283	-0.1881
Failure state authority	-0.0489	0.0093	**0.5137**
Physical integrity	0.2783	-0.2145	0.0914
Empowerment rights	0.2379	0.0103	0.2618
Political terror scale	-0.2846	0.2036	-0.0209
Eps. civil violence	-0.1474	**0.5022**	0.0611
Armed conflict	-0.1311	**0.4613**	-0.0207
Coups d'état	-0.0507	-0.0428	**0.7068**
Revolutionary wars	-0.0859	0.2872	0.2894
Ethnic wars	-0.1225	**0.4502**	-0.1022

Notes: Values higher than 0.3 highlighted in bold.

The loadings obtained for the first principal component are of similar size, which made their interpretation relatively easy. However, interpreting the remaining principal components is not as straightforward. Some methods have been proposed to aid interpretation, one of them being the rotation of the principal components. After deciding that the first *m* components account for the most variation in the dataset, it may be argued that simply interpreting the *m*-dimensional space defined by these components is more relevant than it is to interpret each individual component (Jolliffe, 2002: 270). So, the axes are rotated within this *m*-dimensional space in such a way that the interpretation of the axes is simplified as much as possible, and hopefully more conceptually appealing.[41] I now consider this strategy and discuss the results obtained for the PCA when rotation is considered.

[41] This analysis also corresponds to one of the methods for factor analysis, which, first, finds *q* principal components, and then these are rotated so that they line up more with some of the original values (Cox, 2005: 182).

3.5.3. Results obtained with rotation procedure

There are several procedures for rotation; but, following similar previous analyses (e.g. Larru, 2009[42]), the orthogonal varimax method of rotation is used. Orthogonal procedures lead to new coordinated axes which are perpendicular to one another. The varimax method consists in the rotation of the coordinate axes in order to maximise the varimax criteria, which maximises the sum of the variances of the square loadings within each column of the loading matrix (Dunteman, 1989: 49). This method is applied first in its "raw" form and then with Kaiser normalisation, which means that in the computation of the optimal rotation, all rows have the same weight (StataCorp., 2013).

Table 17 contains the rotated components ordered by decreasing order of variance, without and with Kaiser normalisation. The cumulative proportion of the variance explained by the retained rotated components is identical to the total variance explained by the leading principal components.

Table 17. Variance of the rotated principal components

		Nr observations	1857
		Nr components	3
		Trace	17
		Rho	0.6827
Component	**Variance**	**Proportion**	**Cumulative**
Without Kaiser normalisation			
Comp1	7.1716	0.4219	0.4219
Comp2	3.2901	0.1935	0.6154
Comp3	1.1441	0.0673	0.6827
With Kaiser normalisation			
Comp1	6.9291	0.4076	0.4076
Comp2	3.5543	0.2091	0.6167
Comp3	1.1224	0.0660	0.6827

Tables 18 and 19 report the loadings of the rotated principal components, respectively, without and with the Kaiser normalisation. The results obtained with Kaiser normalisation do not entail many differences when compared with those obtained without Kaiser normalisation. The most striking difference is that in the case of the former, the variables physical integrity and political terror scale are now also highly correlated with the second principal component.

[42] Larru (2009) follows this approach in order to identify the principal components of state fragility in a study comparing Sub-Saharan African countries and Mediterranean countries.

Table 18. Rotated principal components (eigenvectors), without Kaiser normalisation

Variable	Comp1	Comp2	Comp3
Rule of law	**0.3618**	0.0315	-0.0673
Regulatory quality	**0.3530**	0.0251	-0.0173
Independence judiciary	**0.3123**	0.0290	0.1175
Control of corruption	**0.3537**	0.0178	-0.0264
Property rights	**0.3505**	0.0642	0.0178
Gov. effectiveness	**0.3608**	0.0489	-0.0733
Health	0.2633	-0.0601	-0.0012
Access to water	0.2396	0.0441	-0.2053
Failure state authority	-0.0069	0.0258	**0.5154**
Physical integrity	0.1939	-0.2968	0.0783
Empowerment rights	0.2447	-0.0717	0.2455
Political terror scale	-0.1986	0.2888	-0.0072
Eps. civil violence	0.0378	**0.5223**	0.0584
Armed conflict	0.0334	**0.4783**	-0.0233
Coups d'état	-0.0130	-0.0225	**0.7094**
Revolutionary wars	0.0378	0.2994	0.2873
Ethnic wars	0.0320	**0.4648**	-0.1049

Notes: Values higher than 0.3 highlighted in bold.

Table 19. Rotated principal components (eigenvectors), with Kaiser normalisation

Variable	Comp1	Comp2	Comp3
Rule of law	**0.3665**	0.0059	-0.0455
Regulatory quality	**0.3543**	-0.0020	0.0035
Independence judiciary	**0.3061**	-0.0004	0.1359
Control of corruption	**0.3549**	-0.0089	-0.0059
Property rights	**0.3527**	0.0358	0.0402
Gov. effectiveness	**0.3672**	0.0235	-0.0508
Health	0.2576	-0.0805	0.0107
Access to water	0.2539	0.0336	-0.1894
Failure state authority	-0.0353	0.0050	**0.5148**
Physical integrity	0.1659	**-0.3141**	0.0754
Empowerment rights	0.2236	-0.1007	0.2552
Political terror scale	-0.1753	**0.3035**	-0.0051
Eps. civil violence	0.0737	**0.5149**	0.0841
Armed conflict	0.0709	**0.4748**	0.0004
Coups d'état	-0.0565	-0.0505	**0.7058**
Revolutionary wars	0.0434	0.2834	0.3023
Ethnic wars	0.0733	**0.4648**	-0.0817

Notes: Values higher than 0.3 highlighted in bold.

Comparing the rotated principal components with the principal components obtained without rotation, in terms of the first rotated principal component, there are only slight changes in the values of the loadings corresponding to the variables with highest correlation, and in the fact that the variable independence of judiciary is now also highly correlated with this component. The second principal component is very similar in the case of non-rotated results and the rotated without Kaiser normalisation. Thus, it can still be interpreted as an indicator of political violence. The third principal component is very similar in the three cases.

3.5.4. Final considerations

There are some differences in the interpretation of the rotated and non-rotated principal components, which led me to prefer the former. For instance, when considering the first component in the results obtained with PCA without rotation (Table 16), the variables representing state effectiveness have high positive correlations, whereas the variables representing repression and civil violence are negatively correlated with this component (with the exception of physical integrity and empowerment rights, which are negatively correlated with the level of repression in a country). This is in line with the expected from the theory, and means that a country with high levels of state effectiveness will have a higher score in this component. This score will be reduced in the case of a high level of political violence, or increased in the case of low levels of political violence.

However, when looking at the loadings of the variables representing state effectiveness in the second column, one notices that they are all positively correlated with these components, and most of the coefficients are higher than 0.1. This means that a country with high values for these variables will have a high score in this component, misleading its interpretation as an indicator of the level of political violence.

Considering the results obtained after rotation of the components (Tables 18 and 19), one observes that the correlation coefficients between the variables representing civil violence and the first principal component are low, and the same applies to the correlation between the variables proxying for state effectiveness and the second principal component. Although the proxies for repression have a significant influence in the rotated first principal component, this effect is slightly attenuated when the Kaiser normalisation is applied.

The use of the rotation procedure destroys some of the properties of the principal components, namely the first rotated component no longer has maximal variance, the second rotated component no longer has maximal variance among those linear combinations to the first component, and so on (StataCorp., 2013). However, given the benefits for the coherence in the interpretation of the two first principal components, it remains the preferred option.

In a nutshell, the results from PCA corroborated the argument advanced in the previous section that the two symptoms of state fragility must be analysed separately in order to obtain a better grasp of the multidimensionality of state fragility. The results obtained with PCA also indicated that the scores from the first two principal components can be used to determine the scores for the indices measuring these two symptoms. The next section builds upon this idea.

3.6. ALTERNATIVE MEASURE OF STATE FRAGILITY

3.6.1. Implications for an alternative measure of state fragility

In light of the results obtained in the previous section, it seems that the first two principal components can be further used to represent the two symptoms of state fragility – state ineffectiveness (interpreted as the inverse of the first principal component) and political violence. The corresponding indices are obtained from the scores for each country for the first two principal components, which result from the application of the elements of the corresponding eigenvector to the standardised values of the original observations for each country (Rabe-Hesketh and Everitt, 2004: 261).

This proposal is in line with the view expressed recently in the OECD's report on states of fragility, which highly commends the analysis of multiple dimensions of fragility: "[t]his highlights the need for new approaches to assessing and monitoring fragility using metrics that do not reduce fragility measures to a single index but rather allow for tracking multiple (and potentially uncorrelated) dimensions" (OECD, 2015: 45). The obtained indices can then be used to identify the overall position of countries according to their performance in the two dimensions of fragility, avoiding the establishment of thresholds, which are frequently neither theoretically nor empirically justified. In addition, it can serve as a useful tool for further empirical analysis.

Despite the pitfalls of applying indices of state fragility, this type of measurement instrument is still valuable. As highlighted in Ziaja and Fabra Mata (2010: 1), this can be a useful tool for development policy for: "determining which countries need a different approach; monitoring larger trends of global political stability; evaluating the overall impact of development aid; and for investigating the dynamics of state fragility". Furthermore, in comparison with the first group of approaches described in section 2.2, they allow one to consider state fragility as a continuum rather than a discrete variable.

When compared with existing fragility indices, adopting this approach brings additional advantages in terms of the aggregation procedure. First, by considering indicators of state effectiveness and indicators of political violence separately, one avoids the assumption that different components of fragility can compensate each other. As reminded in Ziaja and Fabra Mata (2010: 3), one of the arguments in the literature discussing state formation is that “the security dimension is a necessary condition for stabilizing states – it should thus be modelled as such and the index should not allow other dimensions like economic growth to compensate for security”. By keeping the two indicators separate, instead of aggregated into one index of fragility, the proposed approach overcomes this limitation. Second, by using PCA to obtain the aggregated scores for state effectiveness and political violence, one avoids the establishment of *ad hoc* weights to the different indicators. This is common in existing indices of fragility, and the underlying assumption overlooks the dynamics that exist between the different components of fragility.

Bearing these advantages in mind, in the next subsection I build upon the results from the PCA to obtain an index of state effectiveness and an index of political violence. The analysis carried out in subsection 3.5.4 indicated that the use of a rotation procedure was helpful in terms of the interpretation of the obtained results. Thus, I use the loadings obtained with the latter procedure to build the disaggregated indices of fragility. Tables B3.1 and B3.2 in Appendix B3 provide the annual scores for each of these indices.[43] The following two subsections compare the obtained results with those from cluster analysis, and with existing indices of state fragility.[44]

3.6.2. Comparison with the obtained clusters

a) Period 1993-2002

In order to enable comparison, the scores obtained with PCA were averaged to obtain an overall value for each of the subperiods considered. Additionally, countries within each of the obtained clusters were first ranked by their degree of typicality[45], and then

[43] On a similar manner, PCA was applied separately to the variables proxying for state effectiveness and the proxies for political violence. In terms of the first, the scores obtained were similar to the ones presented here. Given that more data are available for the variables representing civil violence, the originating scores also correspond to a larger number of years and countries. The resulting ranking, though positively correlated to the one presented here, entails some differences. Table B3.3 in Appendix B3 provides a full list of rankings. It is my belief that the analysis presented in this chapter remains more useful. Firstly, it is more suited for comparability reasons. In addition, it allows one to retain the concept of state fragility as a whole, in opposition to the aforementioned approach, which distinguishes *a priori* between the two symptoms and their proxies.

[44] Although the remaining of the chapter makes use of country rankings for purposes of comparison, the focus remains on the proposed measurement approach for the dimensions of fragility, rather than on countries' performance.

[45] With the exception of the cluster of 'least fragile' states, the higher the degree of typicality the higher the level of fragility.

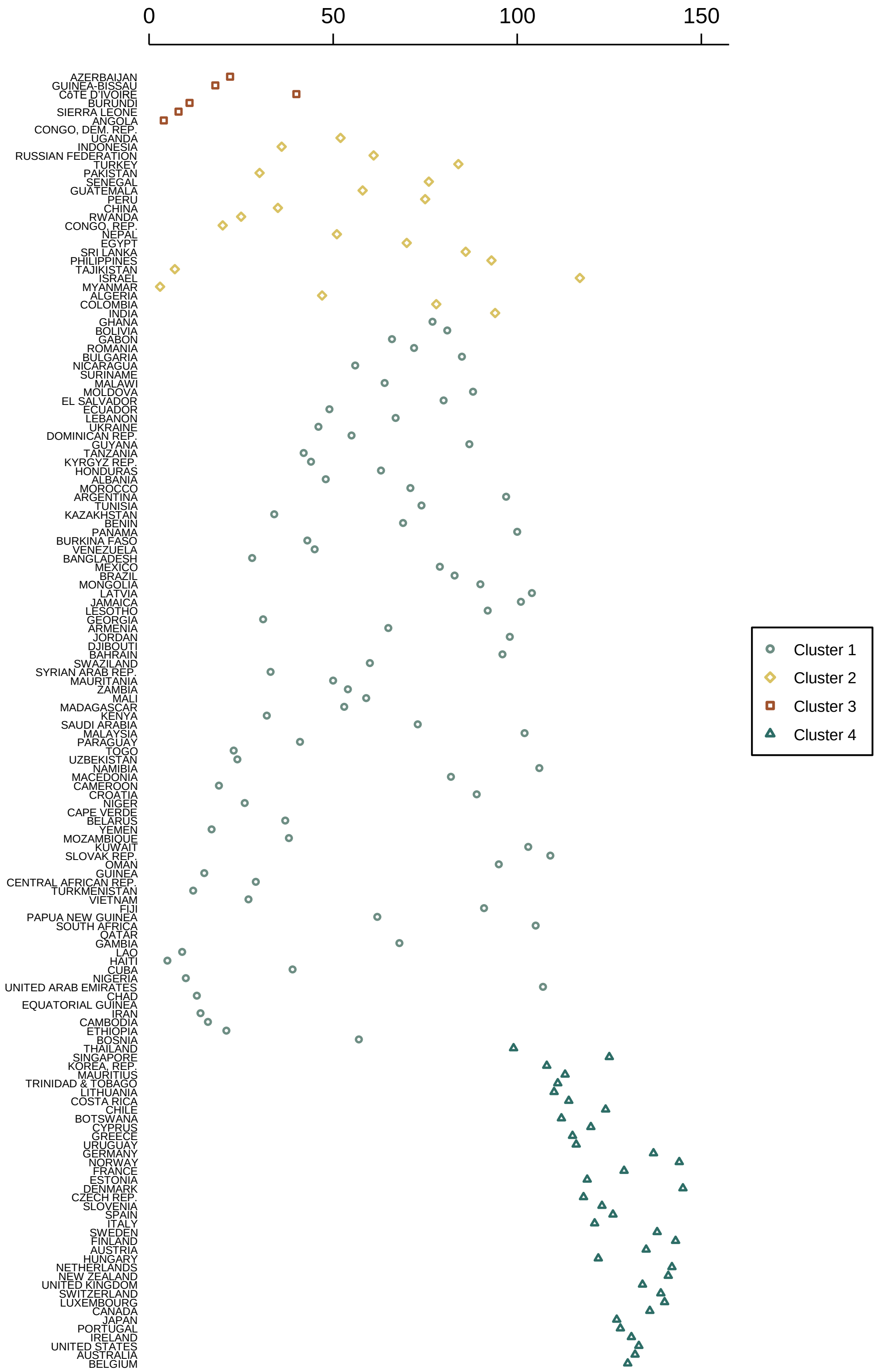
matched with the respective rankings and scores according to the first two principal components obtained with PCA – state effectiveness (SE) and political violence (PV). Countries are ranked from the lowest to highest levels of state effectiveness and from the highest to the lowest level of political violence.

Figures 6 and 7 compare the scores and rankings of countries obtained with PCA with the ordering of countries resulting from cluster analysis for period 1993-2002. Considering the first group of countries, which corresponds to cluster 3, characterised by the lowest levels of state effectiveness and the highest levels of political violence, one observes that the scores for the countries with data available for the indices obtained with PCA also correspond to high positions in the rankings (with the exception of Guinea-Bissau, which shows a lower position in the ranking for political violence). Similarly, when comparing the country scores for the political violence index, one may observe that the countries included in cluster 2 have high scores, and thus high positions in this ranking. Finally, the cluster with the "best performing" countries (cluster 4) is also matched by high scores in the state effectiveness index (low positions in the same ranking) and comparatively low scores in the political violence index. Thus, overall the results of PCA seem to contribute to the conclusions derived from cluster analysis.

Figure 8 plots the rankings for state effectiveness against those for political violence, using different colours to represent the corresponding cluster of each country. It is clear that countries in cluster 4 are ranked lower in both rankings, which means they are less fragile in terms of state effectiveness and political violence. In contrast, countries in cluster 3 occupy some of the highest positions in both rankings. Countries in cluster 2 also show high positions in the ranking for political violence (corresponding to higher levels of fragility in terms of this symptom), but their position in the ranking of state ineffectiveness is varied. Finally, countries in clusters 1 are roughly concentrated in the first three quarters of both rankings, assuming more intermediate positions.

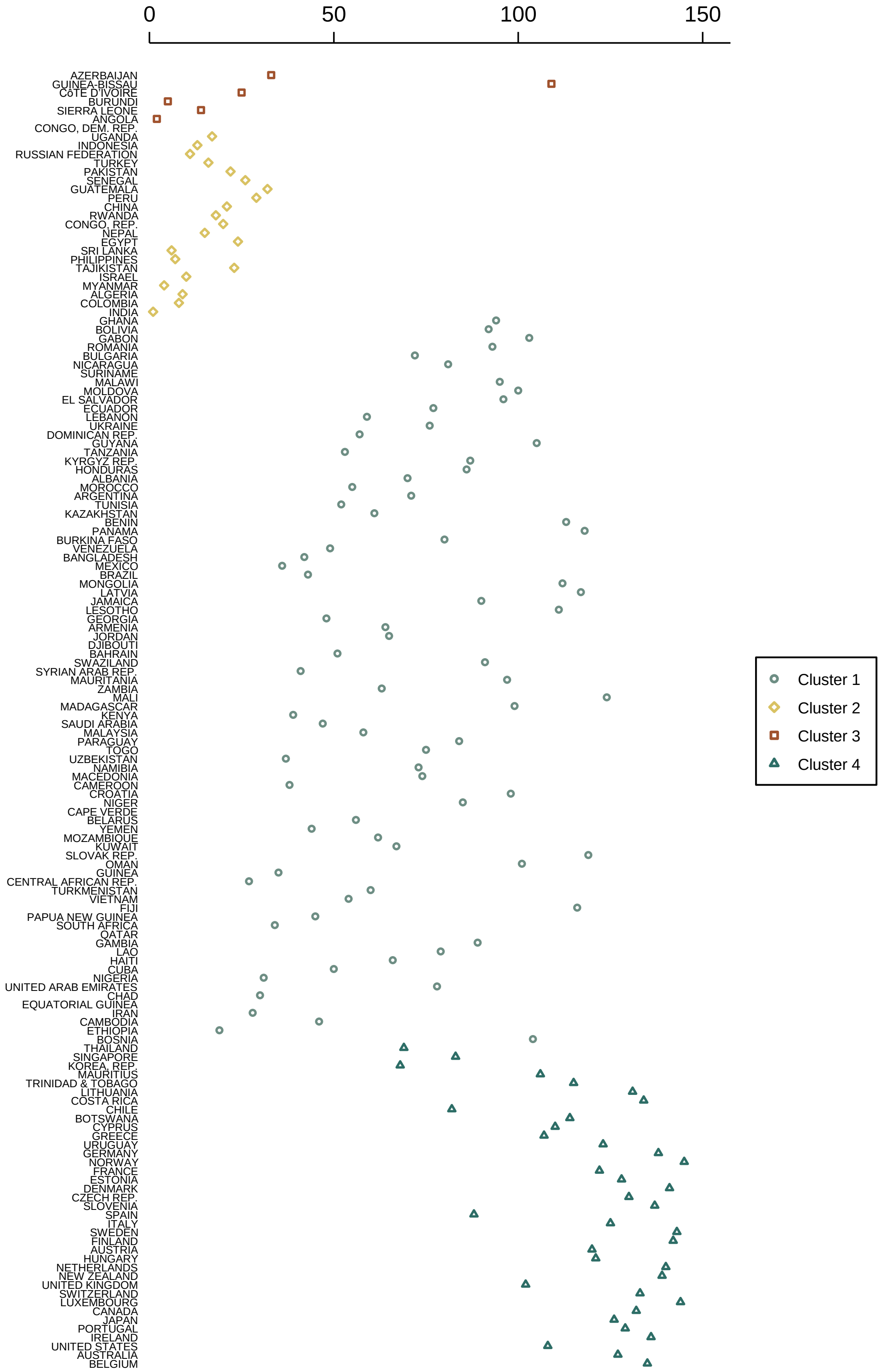
In order to obtain a more direct comparison of the results obtained with the two methods, the analysis was restricted to the countries with values obtained from both methods. New rankings were then calculated using this restricted sample. Even if the construction of the rankings for SE and PV is straightforward, the same does not apply to the results from cluster analysis. For the purposes of the exercise described in the next paragraph, it was assumed that the cluster with the lowest mean values for political violence represented "more fragile" states when compared with the cluster with the

Figure 6. Comparison of the results obtained with cluster analysis and the state ineffectiveness ranking, 1993-2002



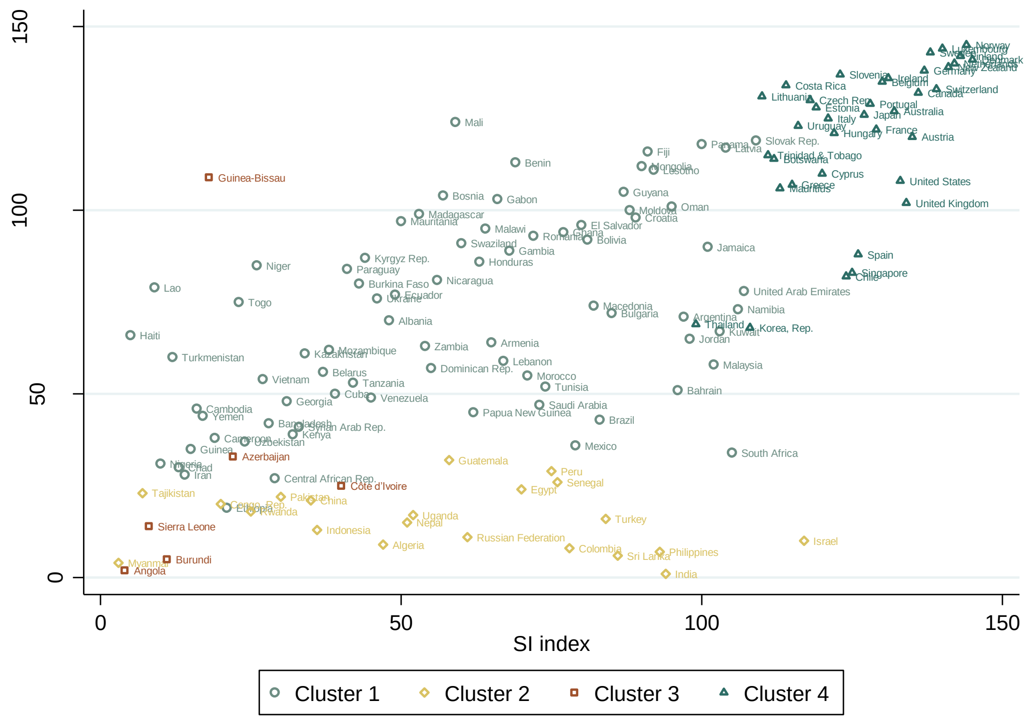
Notes: Total number of countries: 145. For consistency in the presentation of the results, countries are ranked from 1-145 from the lowest to the highest levels of state effectiveness (i.e. from the highest to the lowest level of state ineffectiveness). However, 3 countries ranked by PCA indices not included in the graph, as they were not part of the sample obtained with cluster analysis. The SE ranking for these countries is as follows (scores in parenthesis): Iraq – 1 (-4.923); Libya – 2 (-3.980); and Sudan – 6 (-3.551).

Figure 7. Comparison of the results obtained with cluster analysis and the political violence ranking, 1993-2002



Notes: Total number of countries: 145. For consistency in the presentation of the results, countries are ranked from 1-145 from the highest to the lowest level of political violence. However, 3 countries ranked by PCA indices not included in the graph, as they were not part of the sample obtained with cluster analysis. The PV ranking for these countries is as follows (scores in parenthesis): Iraq – 12 (3.460); Libya – 40 (0.114); and Sudan –3 (6.922).

Figure 8. Ranking positions for the SE and PV indices against cluster groups, 1993-2002



lowest mean values for the variables representing state effectiveness. Additionally, the ranking of countries within each cluster is based solely on the country's score in the indicator of typicality. Thus, the relationships described do not intend to be more than illustrations of the relationship between the results obtained with the two methods.

These rankings are listed in Table B3.4 in Appendix B3, and Table 20 represents the respective Spearman correlation rank coefficients. The last line of the table demonstrates that there is a positive and significant correlation between the rankings from cluster analysis and both the SE and the PV indices, even though the correlation coefficients are not very high. The correlation coefficient between the SE and the PV rankings is also positive and statistically significant, indicating that countries with high positions in one of the rankings also have high positions in the other.[46] However, this result should be regarded with care. When looking at specific cases, and especially when considering the clusters including the 'most fragile' countries, one observes that high scores in one of the symptoms does not necessarily correspond to high scores in the other. For instance, Guinea-Bissau represents an extreme example, occupying position 15 in the SE ranking, but being ranked 106 in the PV ranking. Conversely, Israel and India

[46] I recall here that countries have been ranked from the worst to the best performance in terms of state effectiveness and political violence.

have a low rank of 114 and 91, respectively, in terms of state effectiveness, but occupy the 9th and 1st positions in the PV ranking.

Table 20. Spearman correlation rank coefficients: cluster analysis, SE and PV scores, 1993-2002

	SE rank	PV rank	Cluster rank
SE rank	1.0000		
PV rank	0.6914***	1.0000	
Cluster rank	0.5735***	0.6792***	1.0000

Notes: *** p<0.01, ** p<0.05, * p<0.1.

b) Period 2003-2012

A similar analysis was held for the second subperiod. Figures 9 and 10 compare the scores and rankings of countries obtained with PCA with the ordering of countries resulting from cluster analysis (when available).

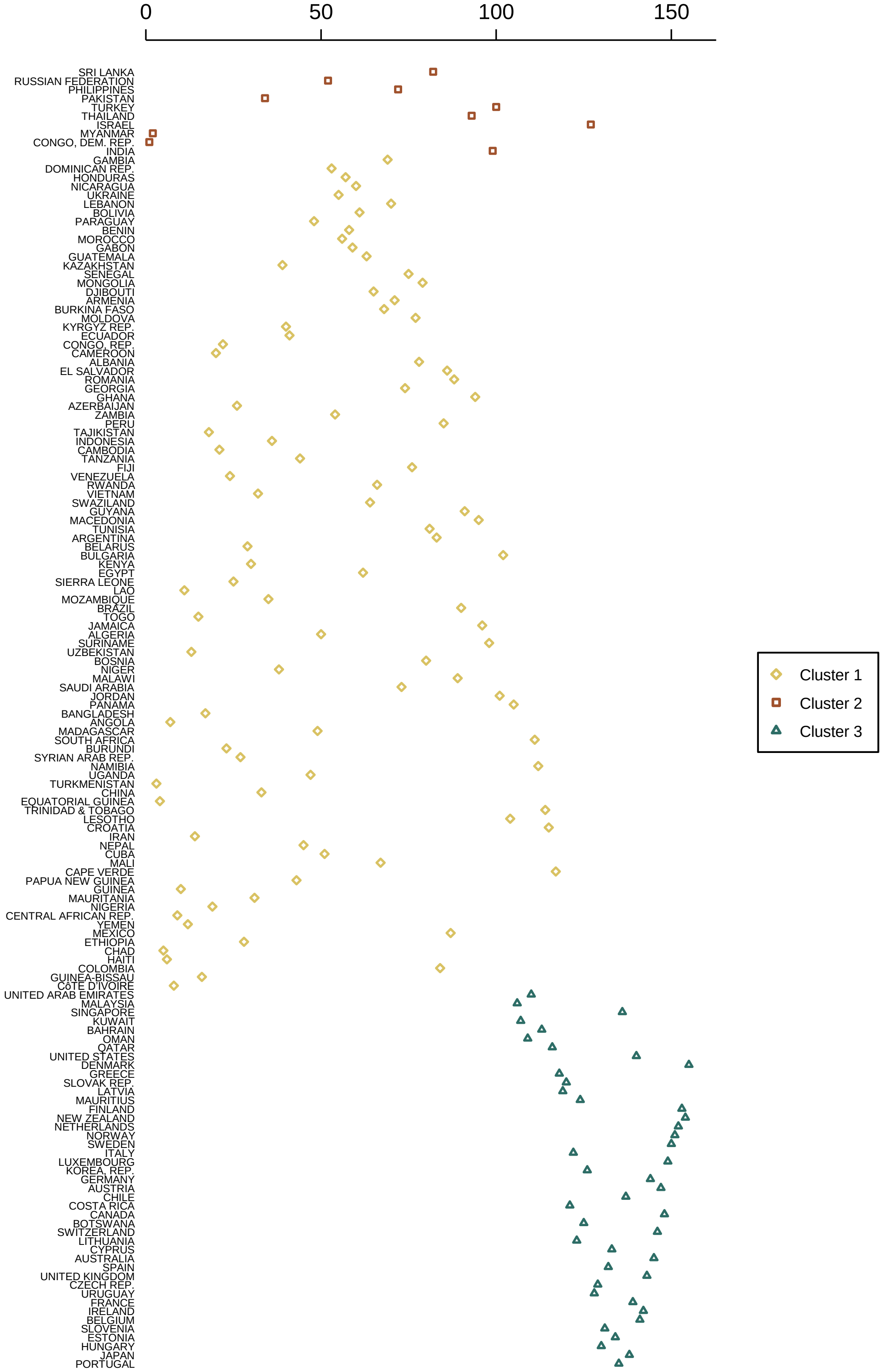
Cluster 2 – characterised by the highest levels of political violence – has also most of the highest values for political violence. Most of the countries with the highest positions in the state effectiveness ranking seem to be part of cluster 1 – which represented the group with the lowest values in this dimension. Finally, the scores in cluster 3, the group of "best performers", show high levels for state effectiveness (and corresponding low positions in the ranking) and overall, also low levels for political violence.

I use a scatterplot again to plot the rankings for the two indices against one another, using different colours to represent the three groups of clusters. This is represented in Figure 11. It is clear that countries with the lowest positions (less fragile) in both dimensions are included in cluster 3. The majority of the most fragile states in terms of state ineffectiveness are located in cluster 1, whereas cluster 2 includes the most fragile states in terms of political violence.

The Spearman correlation rank coefficients were again calculated in order to gain more insight into the relationship between the obtained results.[47] These are included in Table 21, whereas the complete rankings are listed in Table B3.5 in Appendix B3. The rho values indicate that there is a statistically significant, positive correlation between the ranking obtained with cluster analysis and both the SE and the PV rankings. Additionally,

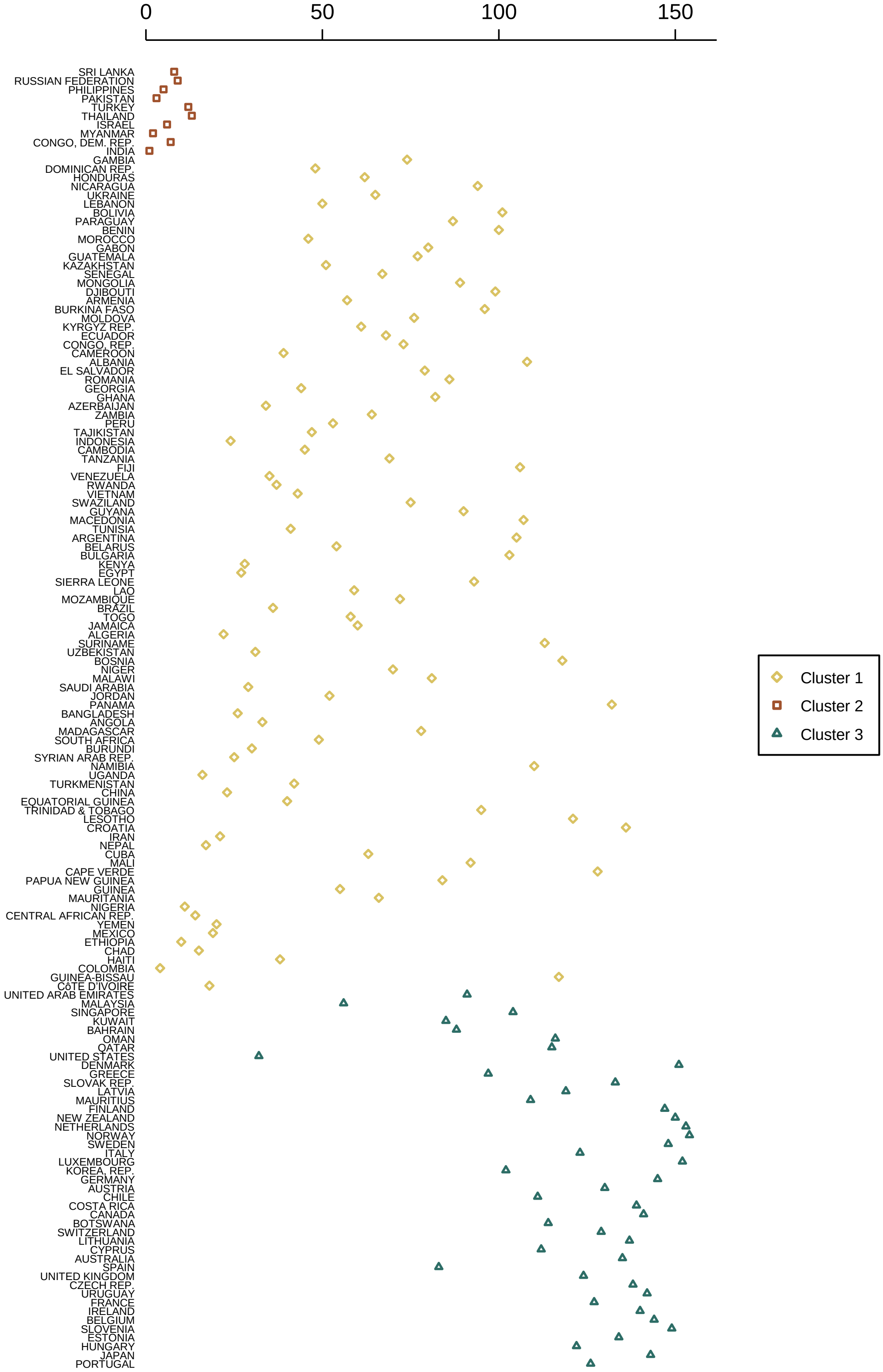
[47] The assumptions made were the same as described for period 1993-2002, and thus the same caveats apply.

Figure 9. Comparison of the results obtained with cluster analysis and the state ineffectiveness ranking, 2003-2012



Notes: Total number of countries: 148. For consistency in the presentation of the results, countries are ranked from 1-148 from the lowest to the highest levels of state effectiveness (i.e. from the highest to the lowest levels of state ineffectiveness). However, there are 7 countries ranked by PCA indices not included in the graph, as they were not part of the sample obtained with cluster analysis. The SE ranking is as follows (scores in parenthesis): Liberia – 37 (-2.131); Comoros – 42 (-1.995); Timor-Leste – 46 (-1.892); Bhutan – 108 (0.651); Montenegro – 103 (0.361); Serbia – 97 (0.170); and Solomon Islands – 92 (-0.120).

Figure 10. Comparison of the results obtained with cluster analysis and the political violence ranking, 2003-2012



Notes: Total number of countries: 148. For consistency in the presentation of the results, countries are ranked from 1-148 from the highest to the lowest levels of political violence. However, there are 7 countries ranked by PCA indices not included in the graph, as they were not part of the sample obtained with cluster analysis. The PV ranking is as follows (scores in parenthesis): Liberia –98 (-0.725); Comoros –146 (-1.340); Timor-Leste –131 (-1.197); Bhutan – 71 (-0.448); Montenegro –125 (-1.143); Serbia – 120 (-1.053); and Solomon Islands –155 (-1.736).

Figure 11. Ranking positions for the SE and PV indices against cluster groups, 2003-2012

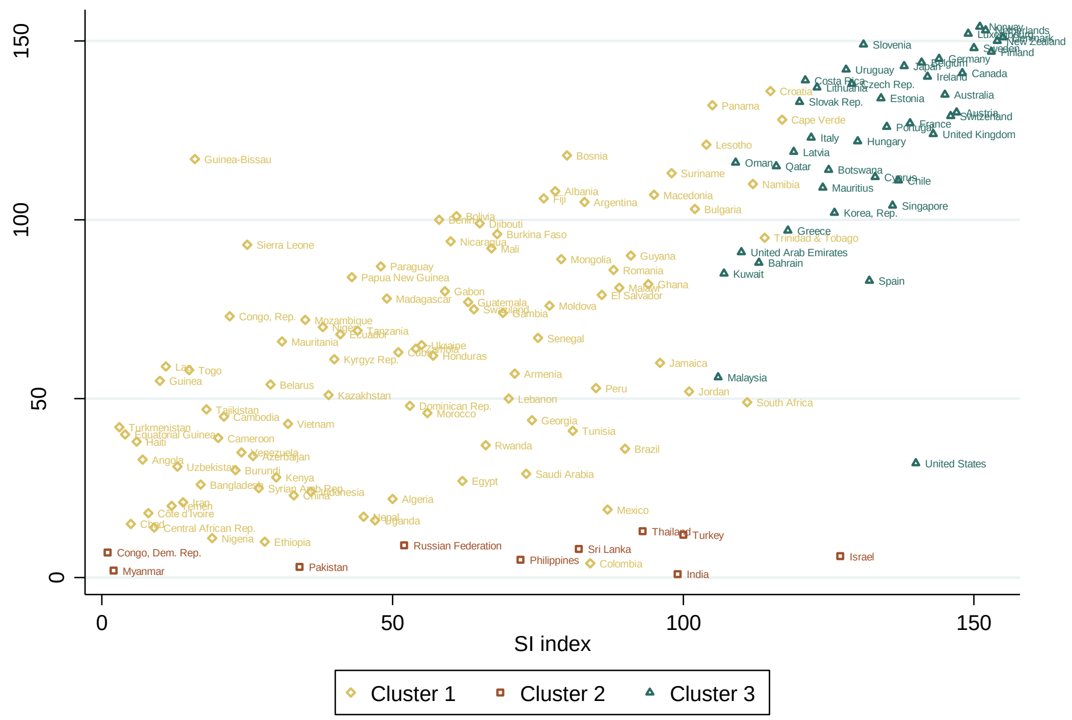


Table 21. Spearman correlation rank coefficients: cluster analysis, SE and PV scores, 2003-2012

	SE rank	PV rank	Cluster rank
SE rank	1.0000		
PV rank	0.7196***	1.0000	
Cluster rank	0.5430***	0.5668***	1.0000

Notes: *** p<0.01, ** p<0.05, * p<0.1.

and similarly to the previous period, there seems to be a strong and significant positive correlation between the rankings obtained for the PV and the SE index. However, some caution is again in order over the conclusions drawn from the analysis of correlation coefficients. The observation of clusters 2 and 1 suggests that several of the countries occupying high positions in the PV ranking do not have high positions for the SE ranking (e.g. Russia, Philippines, or India). The most extreme example is again Israel, which is one of the 'most fragile' states in terms of political violence, but is ordered in position 120 when one considers the SE ranking. The opposite pattern is also found, with some of the highest positions in terms of fragility in state effectiveness corresponding to countries with comparatively lower positions in the PV ranking (e.g. Equatorial Guinea, Turkmenistan, or Angola).

The analysis in this subsection demonstrated that the results for state effectiveness and political violence obtained with PCA seem to corroborate the insights gained with cluster analysis in terms of the differences in country performance for these two symptoms. Thus, it further contributes to the argument of considering the two indices separately when trying to measure state fragility.

Finally, the approach taken in this chapter was data-driven in that there was no distinction *a priori* between the lists of variables that proxy for each of the two symptoms, even though the theory suggested this distinction. However, it is important to clarify that the conclusions reached are similar to those suggested by theory, i.e. the performance of the countries may be different in terms of state ineffectiveness and political violence.[48]

3.6.3. Comparison with existing indices

Having argued that the empirical strategy described in the previous sections allows one to overcome some of the limitations of existing measures of state fragility, I now compare the obtained scores with a selection of the most frequently used fragility indices, highlighting some of the main similarities and differences.

a) Country Policy and Institutional Assessment (CPIA) index

I start with the most widely used indicator of state fragility, the CPIA index. Table 22 includes the rankings obtained for each of the two symptoms and the rankings provided for the CPIA. In order to facilitate comparison, the sample of countries was restricted to those with scores for the three indices and the rankings for this subsample were calculated for the period 2005-2012[49]. The comparison is limited by the fact that the aggregate CPIA scores are only provided for IDA eligible countries. Still, it is possible to make some overall comments.

[48] As illustrated by the aforementioned comparison of rankings included in Table B3.3 in Appendix B3, which lists the rankings obtained using the approach in this chapter with those obtained when PCA was applied separately to the variables proxying for state effectiveness and the proxies for political violence.
[49] A table with a full listing of the countries can be found in Appendix B4, Table B4.1.

Table 22. Comparison of the results obtained with PCA and the CPIA, 2005-2012

Country	SE index	PV index	CPIA
	Rank	Rank	Rank
Angola	3	16	5
Armenia	46	25	60
Bangladesh	15	13	35
Benin	39	47	40
Bhutan	60	37	57
Bolivia	41	54	48
Bosnia	53	56	44
Burkina Faso	45	48	52
Burundi	19	15	15
Cambodia	18	22	25
Cameroon	17	19	19
Cape Verde	61	58	59
Central African Rep.	7	6	3
Chad	2	7	2
Comoros	30	60	1
Congo, Dem. Rep.	1	4	8
Congo, Rep.	16	42	10
Côte d'Ivoire	6	12	6
Djibouti	44	53	16
Ethiopia	23	5	34
Gambia	42	34	24
Georgia	52	26	61
Ghana	57	43	58
Guinea	5	23	13
Guinea-Bissau	12	55	4
Guyana	54	52	31
Haiti	4	27	12
Honduras	38	30	45
India	58	1	53
Kenya	22	14	46
Kyrgyz Rep.	35	24	41
Lao	11	35	20
Lesotho	59	57	38
Liberia	27	51	14
Madagascar	31	38	37
Malawi	56	44	29
Mali	43	41	42
Mauritania	21	28	22
Moldova	50	40	50
Mongolia	49	46	33
Mozambique	25	36	43
Nepal	29	11	28
Nicaragua	40	49	50
Niger	28	32	30
Nigeria	13	8	32
Pakistan	26	2	27
Papua New Guinea	32	45	23
Rwanda	48	18	49
Senegal	47	33	47
Sierra Leone	20	50	18
Solomon Islands	55	61	9
Sri Lanka	51	3	39
Tajikistan	14	20	26
Tanzania	34	39	55
Timor-Leste	36	59	11
Togo	10	29	7

Country	SE index	PV index	CPIA
	Rank	Rank	Rank
Uganda	33	10	56
Uzbekistan	9	17	21
Vietnam	24	21	54
Yemen	8	9	17
Zambia	37	31	36

Notes: The results represented correspond to the countries for each scores for the three indices were available – a total of 61 countries. The rankings were calculated after the sample was restricted to that group, and are, thus, directly comparable. The CPIA rankings were obtained after calculating the average of the scores for the period considered. Data for CPIA from the World Databank (World Bank, 2016).

Considering the countries with the highest positions – in other words, those with the highest level of state fragility – the Democratic Republic of Congo, Chad and the Central African Republic show prominent positions in the three rankings, with low levels of state effectiveness, high levels of political violence, and a low CPIA score. However, some countries show different performances in the SE and PV rankings when compared to the CPIA. For instance, India comes first in the ranking of political violence, but has a lower position in both the ranking for state effectiveness and for the CPIA, whereas Angola has the 3rd and 5th highest positions in the SE and CPIA rankings, respectively, but occupies a lower position in the PV ranking. In an inverse position, other countries located at the bottom of the CPIA ranking, such as Pakistan or Sri Lanka, also have low positions in the ranking according to the SE index, but comparatively higher positions in the PV index, indicating a higher degree of fragility in terms of this symptom. This reiterates the idea that countries show different performances in state effectiveness and political violence, and that, consequently, state fragility should not be considered as a unidimensional phenomenon.

Country rankings are more similar between the CPIA and SE indices than when compared to the PV index, which can be explained by the dimensions included in the calculation of the CPIA. The observation of the plots of the two pairs of rankings in these two indices (represented in Figures 12 and 13) also demonstrates a positive relationship between the CPIA and the SE rankings, and no relationship between the rankings for the CPIA and the PV index. This is corroborated by an analysis of the Spearman rank correlation coefficients represented in Table 23. The coefficient for the relationship between the SE rank and the CPIA rank indicates a significant, positive correlation. However, the relationship indicated by the coefficient between the CPIA rank and the PV rank is very weak, and not statistically significant.

Figure 12. Comparison of the ranking positions: CPIA and SE, 2005-2012

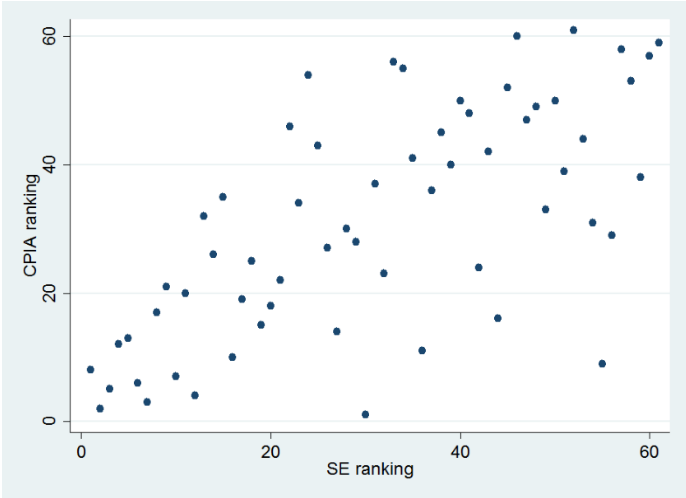


Figure 13. Comparison of the ranking positions: CPIA and PV, 2005-2012

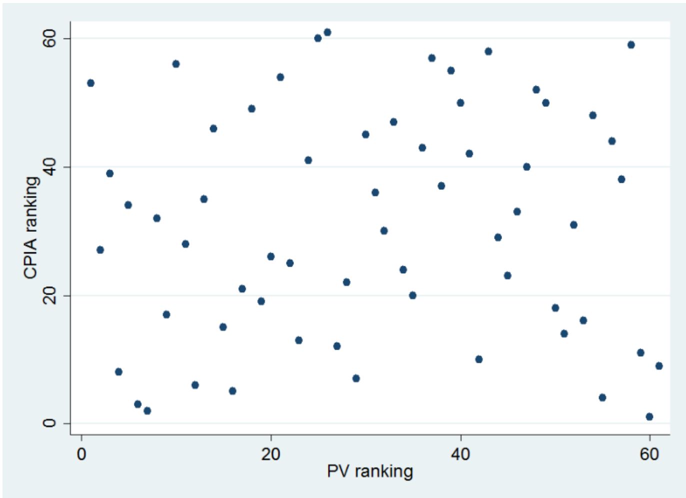


Table 23. Spearman correlation rank coefficients: SE, PV and CPIA scores

	SE rank	PV rank	CPIA rank
SE rank	1.0000		
PV rank	0.4876***	1.0000	
CPIA rank	0.6759***	0.0602	1.0000

Notes: *** p<0.01, ** p<0.05, * p<0.1.

The similarities observed between the country rankings in the index of state effectiveness and the CPIA indicate that the proposed index is also capturing the countries' performance in terms of policy and institutional quality dimensions. Still, the results demonstrate that the CPIA fails to capture the performance of countries in terms of political violence. Thus, the measurement strategy proposed in this chapter not only overcomes the limitation of the CPIA of focusing exclusively on IDA eligible countries, but also provides a more comprehensive approach to the concept of state fragility.

b) Fragile States Index (FSI), State Fragility Index (SFI) and CIFP Fragility Index (CIFP)

A similar exercise was held for each of the other main indices of fragility discussed in section 2.4 of Chapter 2[50]. Table 24 compares the rankings obtained for a restricted list of countries for which scores were available for all of the represented indices. Given that they refer to roughly similar time periods, the rankings are directly comparable.[51] Overall, the rankings obtained with the SE and PV indices seem to be in line with the existing fragility rankings.

Table 24. Comparison of the results obtained with PCA and the SFI, FSI, and CIFP indices

Country	SE index	PV index	SFI	FSI	CIFP
	Rank	Rank	Rank	Rank	Rank
Albania	78	108	109	100	105
Algeria	50	22	28	71	48
Angola	7	33	12	44	20
Argentina	83	105	120	127	118
Armenia	71	57	88	95	89
Australia	145	135	126	148	143
Austria	147	130	145	146	150
Azerbaijan	26	34	36	55	71
Bahrain	113	88	104	115	87
Bangladesh	17	26	41	14	36
Belarus	29	54	108	60	97
Belgium	141	144	129	143	136
Benin	58	100	52	87	40
Bhutan	108	71	66	42	60
Bolivia	61	101	49	48	73
Bosnia	80	118	95	50	72
Botswana	125	114	113	103	107
Brazil	90	36	98	105	114
Bulgaria	102	103	115	112	117
Burkina Faso	68	96	16	28	30
Burundi	23	30	8	12	2
Cambodia	21	45	42	41	52
Cameroon	20	39	15	23	26
Canada	148	141	145	147	145
Cape Verde	117	128	104	75	93
Central African Rep.	9	14	6	4	5
Chad	5	15	2	1	3
Chile	137	111	122	134	126
China	33	23	76	58	76
Colombia	84	4	52	34	74
Comoros	42	146	38	54	35
Congo, Dem. Rep.	1	7	1	2	1
Congo, Rep.	22	73	22	24	19
Costa Rica	121	139	131	120	120
Côte d'Ivoire	8	18	18	3	6

[50] The Index of State Weakness in the Developing World was not considered given that it is available only for 2008, which would limit the comparison with the approach proposed here.
[51] Tables B4.2-E4.4 in Appendix B4 provide a comparison between the scores obtained with PCA and each of the FSI, SFI and CIFP for the corresponding period.

Table 24. Comparison of the results obtained with PCA and the SFI, FSI, and CIFP indices

Country	SE index	PV index	SFI	FSI	CIFP
	Rank	Rank	Rank	Rank	Rank
Croatia	115	136	115	114	121
Cuba	51	63	95	73	109
Cyprus	133	112	115	99	124
Czech Rep.	129	138	136	130	135
Denmark	155	151	145	149	155
Djibouti	65	99	30	57	31
Dominican Rep.	53	48	99	71	79
Ecuador	41	68	59	63	84
Egypt	62	27	45	33	59
El Salvador	86	79	89	84	98
Equatorial Guinea	4	40	48	40	27
Estonia	134	134	136	121	127
Ethiopia	28	10	4	11	4
Fiji	76	106	90	69	75
Finland	153	147	145	154	151
France	139	127	131	137	138
Gabon	59	80	62	88	66
Gambia	69	74	35	74	29
Georgia	74	44	81	42	82
Germany	144	145	145	136	146
Ghana	94	82	46	107	61
Greece	118	97	135	126	122
Guatemala	63	77	57	61	53
Guinea	10	55	9	7	12
Guinea-Bissau	16	117	14	20	11
Guyana	91	90	58	92	62
Haiti	6	38	29	5	13
Honduras	57	62	78	77	57
Hungary	130	122	145	122	128
India	99	1	44	85	45
Indonesia	36	24	68	47	64
Iran	14	21	36	36	39
Ireland	142	140	145	151	144
Israel	127	6	80	53	116
Italy	122	123	139	129	133
Jamaica	96	60	115	104	82
Japan	138	143	144	142	147
Jordan	101	52	90	79	69
Kazakhstan	39	51	75	97	92
Kenya	30	28	42	15	17
Korea, Rep.	126	102	143	133	131
Kuwait	107	85	114	109	102
Kyrgyz Rep.	40	61	56	31	49
Lao	11	59	33	39	33
Latvia	119	119	139	117	123
Lebanon	70	50	72	29	56
Lesotho	104	121	54	62	58
Liberia	37	98	7	21	8
Lithuania	123	137	129	125	134
Luxembourg	149	152	139	145	142
Macedonia	95	107	112	90	100
Madagascar	49	78	46	64	28
Malawi	89	81	27	25	34
Malaysia	106	56	99	102	113

Table 24. Comparison of the results obtained with PCA and the SFI, FSI, and CIFP indices

Country	SE index	PV index	SFI	FSI	CIFP
	Rank	Rank	Rank	Rank	Rank
Mali	67	92	21	76	23
Mauritania	31	66	20	37	10
Mauritius	124	109	128	128	119
Mexico	87	19	107	89	108
Moldova	77	76	69	51	99
Mongolia	79	89	83	113	86
Montenegro	103	125	109	111	77
Morocco	56	46	92	80	81
Mozambique	35	72	25	67	32
Myanmar	2	2	5	8	22
Namibia	112	110	92	93	91
Nepal	45	17	26	18	24
Netherlands	152	153	145	144	148
New Zealand	154	150	127	150	149
Nicaragua	60	94	67	58	55
Niger	38	70	13	17	15
Nigeria	19	11	10	10	14
Norway	151	154	125	155	153
Oman	109	116	106	124	95
Pakistan	34	3	22	6	9
Panama	105	132	95	116	110
Papua New Guinea	43	84	54	45	51
Paraguay	48	87	69	96	94
Peru	85	53	73	82	104
Philippines	72	5	49	46	64
Portugal	135	126	145	141	137
Qatar	116	115	103	118	111
Romania	88	86	102	110	115
Russian Federation	52	9	81	65	63
Rwanda	66	37	10	27	21
Saudi Arabia	73	29	69	82	80
Senegal	75	67	59	91	43
Serbia	97	120	94	70	88
Sierra Leone	25	93	3	22	16
Singapore	136	104	124	140	128
Slovak Rep.	120	133	131	123	130
Slovenia	131	149	145	135	140
Solomon Islands	92	155	65	32	50
South Africa	111	49	76	108	96
Spain	132	83	138	131	139
Sri Lanka	82	8	40	19	67
Suriname	98	113	85	94	101
Swaziland	64	75	79	56	41
Sweden	150	148	145	153	154
Switzerland	146	129	131	152	152
Syrian Arab Rep.	27	25	59	30	42
Tajikistan	18	47	39	35	38
Tanzania	44	69	49	66	37
Thailand	93	13	86	78	90
Timor-Leste	46	131	32	16	44
Togo	15	58	31	38	25
Trinidad & Tobago	114	95	111	106	106
Tunisia	81	41	87	101	103
Turkey	100	12	73	86	84

Table 24. Comparison of the results obtained with PCA and the SFI, FSI, and CIFP indices

Country	SE index	PV index	SFI	FSI	CIFP
	Rank	Rank	Rank	Rank	Rank
Turkmenistan	3	42	62	49	47
Uganda	47	16	17	13	18
Ukraine	55	65	99	98	78
United Arab Emirates	110	91	119	119	112
United Kingdom	143	124	139	139	141
United States	140	32	122	138	125
Uruguay	128	142	121	132	132
Uzbekistan	13	31	33	26	46
Venezuela	24	35	62	68	70
Vietnam	32	43	83	81	68
Yemen	12	20	19	9	7
Zambia	54	64	22	52	54

Notes: The results represented correspond to the countries for which there were scores available for the SE and PV indices – a total of 155 countries. The rankings were calculated after the sample was restricted to that group, and are, thus, directly comparable. The SE and PV rankings correspond to the period 2003-2012. The SFI, FSI and CIFP rankings were obtained after calculating the average of the scores, respectively, for the periods 2003-2012, 2006-2012, and 2006-2012. Data for FSI from Fund for Peace and Foreign Policy (2015), for the SFI from Marshal and Cole (2014b), and for CIFP from Carment, Langlois-Bertrand and Samy (2015).

When comparing the top 10 lists of the most fragile states suggested by each of these indices (represented in Table 25), there are some striking similarities, namely the fact that the Democratic Republic of Congo appears in all of the lists, whereas Myanmar, Chad and Central African Republic feature in four out of the five lists. Ethiopia, Cote d'Ivoire, Guinea and Pakistan are also recurrent features in the top positions. However, there are also some countries that appear uniquely in the top 10 of the SE (e.g. Angola) and PV indices (e.g. India).

Table 25. Top 10 of most fragile states according to the PCA, SFI, FSI and CIFP scores

SE index	PV index	SFI	FSI	CIFP
Congo, DR	India	Congo, DR	Chad	Congo, DR
Myanmar	Myanmar	Chad	Congo, DR	Burundi
Turkmenistan	Pakistan	Sierra Leone	Cote d'Ivoire	Chad
Eq. Guinea	Colombia	Ethiopia	Central Af. Rep.	Ethiopia
Chad	Philippines	Myanmar	Haiti	Central Af. Rep.
Haiti	Israel	Central Af. Rep.	Pakistan	Cote d'Ivoire
Angola	Congo, DR	Liberia	Guinea	Yemen
Cote d'Ivoire	Sri Lanka	Burundi	Myanmar	Liberia
Central Af. Rep.	Russia	Guinea	Yemen	Pakistan
Guinea	Ethiopia	Nigeria	Nigeria	Mauritania

Notes: Rankings calculated after the sample was restricted to the 155 countries with scores available for the SE and PV indices. Coefficients obtained by direct comparison of the rankings for each of the SFI, FSI, and CIFP indices and the SE and PV rankings for the same period, namely 2003-2012 in the case of the first, and 2006-2012 for the FSI and CIFP. Sources: Fund for Peace and Foreign Policy (2015); Marshal and Cole (2014b); Carment, Langlois-Bertrand and Samy (2015).

This conclusion also becomes clear from the observation of the Spearman correlation coefficients represented in Table 26. There are strong, positive, and statistically significant correlations across the five indices. More specifically, all the correlation coefficients between the SE index and the three existing indices are above 0.85. With regards to the PV index, the coefficients are smaller, indicating that this index may be capturing some dimensions that do not necessarily correspond to the existing indices.

Table 26. Spearman correlation rank coefficients: SE, PV, SFI, FSI and CIFP scores

	SE rank	PV rank	SFI rank	FSI rank	CIFP rank
SE rank	1.0000				
PV rank	0.6898***	1.0000			
SFI rank	0.8577***	0.6548***	1.0000		
FSI rank	0.8682***	0.6839***	0.9078***	1.0000	
CIFP rank	0.8784***	0.6287***	0.9518***	0.9134***	1.0000

Notes: *** p<0.01, ** p<0.05, * p<0.1. The Spearman correlation rank coefficients were obtained by direct comparison of the rankings for each of the SFI, FSI, and CIFP rankings and the SE and PV rankings for the same period, namely 2003-2012 in the case of the first, and 2006-2012 for the FSI and CIFP.

Still, as highlighted previously when discussing Table 25, some of the countries scoring high (low) in the SE and PV indices occupy lower (higher) positions in the three existing indices of fragility. For instance, Ethiopia occupies high positions in the SFI, FSI and CIFP rankings, but ranks comparatively lower in the SE index. This suggests that fragility in this country is related more to aspects of political violence than to state effectiveness indicators. Conversely, the comparatively lower position of Chad and Central African Republic in the PV index against higher positions in the remaining indices indicates that the degree of fragility in these countries is driven more by lack of state effectiveness. Thus, a closer look at these country cases seems to contribute to the idea that considering the two symptoms of fragility separately provides important insights.

To sum up, in this section I provided a justification for the use of the PCA held in section 3.5 to build an alternative measure of state fragility, arguing that this approach responds to the call expressed recently to preserve the multidimensionality of the concept and overcomes some of the limitations related to the aggregation procedure employed in existing approaches. The resulting indices of state effectiveness and political violence were then compared not only with the clusters of countries obtained in section 3.4, but also with a selection of existing indices of state fragility. Overall, the index of state effectiveness had a significant and strong positive correlation with the CPIA, State Fragility Index, Fragile States Index, and CIFP Fragility Index, and especially with the last mentioned. This seems to demonstrate that the results obtained are in line with what are perceived to be the main elements captured by an index of state fragility.

With the exception of the CPIA, the political violence index was also significantly and positively correlated with the considered fragility indices, though to a lower degree. A more detailed analysis of the country rankings showed some marked differences in the comparison of the rankings of existing indices with the one obtained with the political violence index, which seems to indicate that some caution is in order over how representative they are of this symptom of state fragility. This contributes to the argument of this chapter to consider state effectiveness and political violence separately in order to overcome the problems of using unidimensional measures of a multidimensional phenomenon.

3.7. CONCLUSION

This chapter proposes an alternative approach to measuring state fragility that takes into consideration its multidimensional character by providing an index for each of its two symptoms – state ineffectiveness and political violence. The advantages of this proposal are twofold. First, the conceptualisation of state fragility is based on a sound theoretical grounding. The two symptoms are derived from Besley and Persson's (2011a) model, which clearly distinguishes between causes, symptoms and outcomes of state fragility. Second, by using PCA to obtain the indices, it overcomes some of the methodological problems of existing indices, namely related to their aggregation procedures.

Some interesting findings from adopting this approach can be highlighted. The results from cluster analysis helped to uncover some nuances in the groupings of countries according to the two symptoms, concurring to the view that they should be analysed separately. PCA further contributed to this view. From the three principal components retained from the analysis, the first two seem to represent the two symptoms of state fragility used in the working definition. The inverse of the first principal component is an indicator of state ineffectiveness, whereas the second seems to be representative of political violence.

Additionally, the Spearman rank coefficients between the SE and PV indices obtained with different subsamples are always positive as expected, given the ranking of countries from the least to the most effective and from the most to the least violent. Still, the values for the Spearman rank coefficients are no higher than 0.72, suggesting that countries' overall position varies according to the dimension considered, as illustrated by the examples of Israel or India. Having the highest position in the PV ranking, the latter is an interesting case. This value can be tentatively explained by the levels of civil conflict and repression in the country during the period considered. A final interesting result is the fact that the CPIA seems to capture only one of the dimensions. This has implications for the numerous analyses using this index as a measure of fragility.

These results open up possibilities for further analysis. In particular, the two indices can be used to throw some light on how different degrees of fragility in each symptom influence economic development. Additionally, they may be used to explore how development assistance has an effect on fragile states, depending on the combination of the levels of state effectiveness and political violence in the country. I take these two avenues as the object of study in the next chapters of this thesis.

PART II. EXAMINING THE LINKS BETWEEN STATE FRAGILITY, AID AND DEVELOPMENT

CHAPTER 4. THE IMPACT OF STATE FRAGILITY ON GROWTH

4.1. INTRODUCTION

I began this thesis by explaining the context in which the term fragile states emerged in the policy and academic discourses. The main argument was that it appeared as a result of a concern over security and development, triggered by events occurring during the last decades of the twentieth century. At the core of the discourse on fragile states is the postulate that state fragility has a negative impact on economic development. This hypothesis is put under scrutiny in this chapter.

The country-specific evidence on the economic performance of fragile states is not scarce. However, cross-country analyses of the links between state fragility and growth are still rare. This chapter aims to fill this gap by following the tradition of the growth literature to determine if, when taking the two dimensions into account, one finds any impact of state fragility on growth. To be clear, the main contribution is to test whether, on average, state ineffectiveness and/or political violence have a detrimental effect on the growth performance of a country.

The theoretical underpinning for this hypothesis is provided by Besley and Persson's (2011a) model. In the spirit of the literature examining the effect of specific conditions on growth, I use a standard growth equation and add a term for state ineffectiveness and another for political violence, together with their interaction at a later stage. The two indices obtained in Chapter 3 are used as indicators for these dimensions. Standard econometric techniques, namely Ordinary Least Squares (OLS) and Instrumental Variables (IV) methods, are applied to test this postulate. I consider both cross-country and panel datasets, as well as different time periods, time horizons, and country samples, and a range of different estimation techniques.

The results are easy to summarise. The weight of the evidence suggests that, as expected, state ineffectiveness has a significant negative effect on economic growth. This result is robust to variations in the data used and the method employed. The conclusion for the effect of political violence is less clear-cut. In contrast to the expectation, there is some evidence suggesting a positive effect, but this result is not robust to variations in the specifications used.

Even though the two state symptoms are often expected to be correlated, as suggested by Besley and Persson's (2011a) matrix of fragile states, different combinations of these two symptoms may lead to different outcomes[52]. Thus, in addition to exploring their separate effect, the analysis in this chapter also considers their possible interaction. The obtained results show no evidence that the effect of state ineffectiveness (or political violence) on economic growth in a country depends on the level of political violence (or state ineffectiveness).

These conclusions have implications for the understanding of how to assist fragile states. The fact that state ineffectiveness has a detrimental impact on the growth performance of a country is already well established in the literature. However, the results in this chapter demonstrate that the effect of political violence may not be as easily discernible. Moreover, if the two dimensions entail such distinct results, one can reaffirm the need to consider them separately when examining state fragility.

The chapter is organised as follows. In the next section, I establish the links between this analysis and the existing literature. Section 4.3 recovers the proposition established by Besley and Persson (2011a) in terms of the link between state fragility and development, in order to derive the testable hypotheses. Additionally, it presents the empirical model and describes the data used. The results of a diagnostic analysis of the data are presented in section 4.4, whereas the main results from the estimations are discussed in section 4.5, which also includes some robustness checks. Finally, section 4.6 draws the overall conclusions and compares them to the existing literature, and section 4.7 concludes.

4.2. LITERATURE REVIEW

The tradition of using cross-country regressions to examine economic growth and its determinants has been established since the early studies towards the end of the 1980s and the beginning of the 1990s. The canonical cross-country growth regression is the result from the transition from neoclassical theory to econometrics.[53] As outlined in

[52] See Chapter 3 for a more detailed discussion of Besley and Persson's (2011a) model and of the reasoning justifying the analysis of the separate effects of these symptoms, as well as their possible interaction.

[53] I refer to Maier (2010) for a review of growth models and economic explanations for underdevelopment in the context of fragile states.

detail in Durlauf, Johnson and Temple (2005)[54], the baseline theoretical framework starts with a generic one-sector growth model and derives an equation that decomposes the growth rate into two sources: i) the rate of technological progress, and ii) the "catching up" factor, i.e. the difference between the initial output per worker and the steady-state value. This is the baseline for the standard cross-country growth regression used in the empirical growth literature. Mankiw, Romer and Weil (1992)[55] model aggregate output with a three-factor Cobb-Douglas production function and derive a growth regression model that is linear in observable variables. The standard cross-country regression is a version of this, which can be generically represented as:

$$g_i = \beta \log y_{i,0} + \psi X_i + \pi Z_i + \varepsilon_i,$$

where i indexes countries, g_i represents the rate of growth and $\log y_{i,0}$ is the logarithm of the initial level of output per labour unit. X_i encompasses a constant, the logarithm of the sum of the rates of population growth, technological progress and depreciation (which determines the rate at which effective capital-labour ratio needs to be replenished), as well as the logarithms of the savings rates of physical capital and human capital. Together with $\log y_{i,0}$, the variables included in X_i represent the growth determinants suggested by the Solow growth model. The variables included in Z_i represent growth determinants that are outside of the original version of this theory, and vary considerably among the existing analyses, whereas ε_i is a stochastic term capturing all omitted influences. The overall idea of this type of equation is that growth can be expressed as a function of initial income and the determinants of the steady-state.

This regression specification has been the basis for the empirical growth research. Due to Robert J. Barro's seminal work using it in the study of growth determinants (Barro, 1991; 1997), this type of growth regression has been labelled as Barro-style growth regression. Barro (1997: xi) argues that the growth rate depends on the initial level of output and its steady-state level, which will in turn be dependent on government policies and on household behaviour in terms of saving, work effort, and fertility. He suggests that there is a conditional convergence effect; in other words, for given determinants of the steady-state level, the growth rate is negatively related with the initial level of output. Additionally, the growth rate increases with higher levels of the steady-state output

[54] The following description of the theoretical foundations of the growth regressions used in empirical analysis follows closely the explanation provided by these authors. I refer to their work for more detail.
[55] These authors provided an important contribution to the empirical research on economic growth, and their formulation, which is close to that in Barro (1991; 1997), has been widely applied.

level. The empirical results lend support to these hypotheses. Using panel data for a sample of approximately 100 countries for the period 1960-1990, Barro (1997) finds that, for a given initial level of real per capita GDP, higher initial levels of schooling and life expectancy, lower fertility rates and government consumption, better protection of the rule of law, lower inflation, and improvements in the terms of trade contribute to higher growth rates.

The use of growth regressions in development economics stems from the interest in understanding the underlying factors that explain the differences in the economic performance of countries. This has led to a plethora of studies examining different growth determinants. As mentioned before, given that growth theory does not provide a definite list for the determinants of growth, these variables vary greatly from paper to paper. Durlauf, Johnson and Temple (2005) provide a survey of 145 different regressors that have been used in the literature, but group them into 43 conceptually distinct categories of growth determinants. In an attempt to throw light on the "true" correlates of growth, Sala-i-Martin (1997) ran two million regressions using 62 variables employed in the literature, and found that 22 appeared to be significant according to the criteria established by the author.[56] In the face of this challenge, recent studies include their variable of interest and use the results from previous empirical studies as a guideline for the choice of control variables.

4.2.1. The link between state fragility and growth

Despite being at the core of the discourse on fragile states, the link between state fragility and economic development has only been examined in the context of cross-country regressions in a few studies.[57] Bertocchi and Guerzoni (2010) distinguish between empirical studies focusing on the direct impact of fragility on economic development, from those exploring an indirect effect through aid. This chapter contributes to the first of these groups.

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[56] Sachs and Warner (1997), Bosworth and Collins (2003) and Sala-i-Martin, Doppelhofer and Miller (2004) also contribute to the quest for the determinants of long-run growth using growth regressions.

[57] The field of political science is not short of accounts of the challenges imposed by failing and failed states, especially before the fragile states term become in use. The majority of these studies focus on state-building and peace-building, and make use of case studies and comparative analysis. The reports from development organisations are also filled with qualitative evidence of the perceived effects of state fragility on development, based on country-specific evidence as well as on comparative analysis. However, given the focus of this chapter, these are not reviewed here.

In an early account, Chauvet, Collier and Hoeffler (2007) explore the costs of failing states, conceptualising "failure" around three aspects: i) hurt citizens in neighbouring countries; ii) lack in the provision of basic security for their own citizens; and iii) failure to secure an environment in which poverty reduction is achievable. Considering the period 1998-2001, their empirical strategy consists of adding dummy variables for failing states[58], for states in civil war, and for neighbourhood spillovers to a growth regression, and then using OLS and Generalized Method of Moments (GMM) methods to estimate the percentage of reduction in the growth rate. They conclude that being a failing state at peace corresponds to a decrease in the growth rate by 2.6 per cent when compared to countries at peace with adequate policies and governance. Furthermore, a switch from peace to war leads to a further reduction in growth of 1.6 per cent. Their calculation of the total costs of failing states amounts to around US$276 billion per year, which leads the authors to suggest that there is a strong case for "over-riding sovereignty" and "inducing reform in failing states" (Chauvet, Collier and Hoeffler, 2007: 12).

Bertocchi and Guerzoni (2010) focus on Sub-Saharan Africa to examine the effect of state fragility on development. Making use of a dataset including 28 countries for the period 1999-2004, the authors apply both pooled OLS and Two-Stage Least Squares (2SLS) estimators to a standard Barro (1991) growth regression. Using the OECD-DAC definition of fragile states[59], they conclude that there is no significant impact of fragility on economic growth. However, when applying a more extreme definition, which restricts the list of fragile states to those countries belonging to the bottom quintile of the CPIA rating or unrated, the results show a clear, negative impact.[60]

Despite the profusion of studies examining the effect of related factors – such as corruption, institutional quality, or state capacity, among others – on growth, to the best of the author's knowledge, these are the only studies that focus explicitly on the

[58] Defined as the LICUS countries that have been in this position for a continuous period of at least four years.
[59] Countries belonging to the bottom two quintiles of the CPIA ratings, or unrated.
[60] I also refer to the analysis in Besley and Persson (2011c), which brings together their work on state capacity and political violence. It includes the development of the model that serves as a basis for their paper (Besley and Persson, 2011a), and which has been extensively used for the conceptualisation of state fragility in this thesis. This work includes an empirical application of their framework in which the authors build an index of prosperity. However, this index is not used in further empirical regression analysis of the type used in this chapter. Additionally, despite being based on the same theoretical framework, the approach to state fragility used here departs from their proposal by using an index for each of the two dimensions, and by not including a measure of income in its construction. In Besley and Persson (2014) these authors offer a more recent account of the links between state capacity, political violence, and income, despite not providing any empirical analysis.

examination of the link between state fragility *per se* and economic growth in the context of cross-country regressions.[61] The main contribution of this paper is to fill this gap in the literature. The following paragraphs briefly outline the findings derived in related work. I refer to Maier (2010) for a more comprehensive review.

4.2.2. Related studies within the empirical growth literature

By focusing on the impact of state ineffectiveness and political violence on economic growth, this chapter also contributes to different strands of studies within the growth literature. The first contribution is towards the group of studies rooted in the idea that different rates of economic growth can be explained by differences in state effectiveness or in other forms of state capacity. The second is the line of argument that examines the impact of different dimensions of political violence on growth rates. The paragraphs below provide a brief overview.

a) Effect of state capacity, governance and institutions on growth

Whereas initial work examined the effect of related concepts, such as "social advance" (Abramovitz, 1986), "social development" (Adelman and Morris, 1967) and "social infrastructure" (Hall and Jones, 1999)[62], over the last two decades, there has been an increasing focus on governance. One observes a tendency towards assessing its level by using the lenses of the state, and underlining the importance of state capacity as an essential feature for effective governance (Savoia and Sen, 2015). Due to its multidimensionality, state capacity has been conceptualised and measured in a variety of ways[63]. The assumptions about the mechanisms through which the state affects development outcomes will dictate the type of state capacity that promotes development, and different authors have focused on different channels (Savoia and Sen, 2015: 442).[64]

[61] Despite the link with state fragility, the object of analysis of Chauvet, Collier and Hoeffler (2007) is failing states and not fragile states.
[62] I refer to Bockstette, Chanda and Putterman (2002) for a review of these studies.
[63] See Hendrix (2010) and Savoia and Sen (2015) for reviews of definitions and operationalisation of the concept, as well as recent empirical research on the measurement of state capacity.
[64] A detailed review of these studies is out of the scope of this section, but I refer to Cingolani (2013) for a comprehensive overview, and focus here on some of most prominent papers.

Evans and Rauch (1999) find a strong association between "Weberianness" and economic growth in 35 emerging economies for the period 1970-1990. Their "Weberianness Scale" is a measure of the degree to which meritocratic recruitment and the offer of predictable, rewarding long-term careers characterises core state agencies (Evans and Rauch, 1999: 749). The results in Bockstette, Chanda and Putterman (2002) show a positive association between state antiquity[65] and economic growth for 94 countries over the period 1960-1995.

A different line of work uses measures of institutional quality in the empirical analysis. Focusing on the period 1974-1989, and using data from the International Country Risk Guide (ICRG) and the Business Environmental Risk Intelligence (BERI), Knack and Keefer (1995) found that institutions that protect property rights are crucial for investment and growth.[66] Extending the period until 2000 and using three alternative measures for the level of corruption (including the ICRG index), Mendez and Sepulveda (2006) concluded that there is a non-linear relationship between corruption and growth, with corruption being favourable at low levels of incidence and harmful to economic growth at high levels of incidence.[67] Combining growth regressions with growth accounting, Bosworth and Collins (2003) argue that a part of the cross-country variation in economic growth over the forty-year period between 1960 and 2000 can be explained by the quality of the governing institutions (e.g. law and order, absence of corruption, and protection of property rights).[68]

Within this literature, some authors have started to unpack the concept of state capacity by distinguishing between different components (see Bardhan, 2016, for an overview). Dincecco and Katz (2014) find a significant link between fiscal centralization and economic growth for a sample of 11 European countries for a long-term period between 1650 and 1913. Using different indicators of governance from the World Bank's Worldwide Governance Indicators database, but focusing on the impact of regulatory quality, Jalilian, Kirkpatrick and Parker (2007) suggest that there is a strong causal link between this dimension and economic growth.

[65] State antiquity is measured by an index taking a value between 0 and 1, which results from the scores on the following three questions: i) is there a government above the tribal level? ii) is this government foreign or locally based? iii) how much of the territory of the modern country was ruled by this government? (Bockstette, Chanda and Putterman, 2002: 352)

[66] The same authors used data since 1960 until 1989 on different indicators of institutional quality to test the link between institutions and convergence (Keefer and Knack, 1997).

[67] See Serritzlew, Sonderskov and Svendsen (2014) for a more detail review of the work examining the link between corruption and growth.

[68] The connection with the literature on "good governance" is also apparent, but will not be explored in detail here.

More tangentially, this chapter also relates to two other groups of studies. The first comprises the work testing the link between historical institutional factors and economic growth. Among these studies, I highlight Engerman and Sokoloff (1997; 2002), La Porta et al. (1998), and the seminal work by Acemoglu, Johnson and Robinson (2001), and refer to Nunn (2009) for a review of their findings and an overview of this research. The second group of studies is positioned within the empirical literature examining aid allocation and aid effectiveness, which makes use of cross-country growth regressions. Within this large body of studies, measures of institutional quality are frequently used as controls (and also in interaction terms with aid). Additionally, the CPIA index (which, as previously mentioned, is used as an indicator of state fragility) is employed as an overall indicator of the level of governance in a country (e.g. Collier and Dollar, 2002).

b) Effect of political violence on growth

In parallel to this literature, a large number of papers have examined the significance of political variables in growth regressions. It is out of the scope of this section to review this literature to a great extent, but I refer to Carmignani (2003) for an overview. Here I focus on recent work addressing this dimension, and describe the main results from studies that include in their analysis the variables used in the construction of the political violence index.[69] I recall that it encompasses physical integrity, empowerment rights, and an indicator of political terror as proxies for the level of repression in a country; as well as episodes of civil violence, of armed conflict, and the number of coups d'état, revolutionary wars, and ethnic wars as proxies for civil conflict.

Some authors have tested the relationship between repression or its opposite, political freedom, on economic growth. An early study by Chen and Feng (1996) reports that the analysis of cross-sectional data for 88 countries for the period 1974-1990 confirms the expected negative effect of government repression on economic growth. Considering the period 1975-2004, and using data for about 100 countries, Chauffour (2011) found a positive effect of civic and political rights on economic growth.

Focusing on the growth effect of civil wars[70], Collier's (1999) influential work found that when considering all civil wars during the period 1960-92, the results indicate a decline

[69] It is important to highlight that these studies explore the variation across countries, but in most cases they use panel data and employ panel data methods in the empirical estimations.
[70] I refer to Polachek and Sevastianova (2012) and to Bove, Elia and Smith (2017) for more detailed reviews of the literature.

of GDP per capita at an annual rate of 2.2% during civil wars in comparison to its counterfactual. The results for Sub-Saharan African countries over the period 1960-1996 obtained in Gyimah-Brempong and Corley (2005) concur with the prediction that civil war incidence and severity have a negative and significant effect on economic growth. This is in line with previous work that has found the link between civil war incidence and economic growth to be negative (e.g. Barro, 1991; Sala-i-Martin, 1997). More recently, the results obtained by Murdoch and Sandler (2004) show that in the short-run (5-year period), per capita real GDP growth is predicted to be 0.05 percentage points less if there is a civil war in the country during that period. Bodea and Elbadawi (2008) concur with the view that political violence, and particularly civil war, has a significant negative effect on growth. This is corroborated by Polachek and Sevastianova (2012) who estimate a reduction of between 0.01 and 0.13 percentage points in annual growth due to civil war. Biswas et al. (2016) fail to find a significant effect of ethnic civil war on income growth over the period 1975-2005, although the negative contemporaneous impact of non-ethnic war is significant.

However, two early accounts point to the opposite effect. Organski and Kugler (1977) find that 15-20 years after the war its effects have dissipated and countries recover the level of pre-war performance, a phenomenon that authors label as the "phoenix factor". The evidence in Collier (1999: 176) also suggested that the post-war growth rate actually improved 5.9% *per annum* after a 15-year war.[71] More recently, also using cross-sectional data, but extending the period until 2001, Cerra and Saxena (2008: 442) show evidence of a partial rebound of output following a civil war. This is also corroborated by Murdoch and Sandler (2004), whose results show that in the long run, there is the possibility of recovery, and even catch-up, after civil war.

Although these results seem counterintuitive at first, the literature has advanced theoretical arguments on the positive effects of civil war on economic growth. For instance, the participation in civil wars may lead to improvements stemming from institutional changes and technological innovations, and can also enable socio-economic changes that were otherwise blocked by the existing social order or special interests (Bove, Elia, and Smith, 2017).[72] Still, some authors also fail to find any significant effect. Among other dimensions, Jong-A-Pin (2009) uses an indicator of politically motivated violence and another of mass civil protest, and finds a positive but not significant effect

[71] This effect loses significance when the sample of countries is restricted, and when fixed-effects and random-effects methods are used.
[72] I refer to Bove, Elia and Smith (2017) for a more comprehensive review of these and related arguments.

for both of these variables. Aisen and Veiga (2013) use data for 169 countries over the period 1960-2004 and, among different indicators of political instability, employ an indicator of violence that includes revolutionary and civil wars. The results show a negative but non-significant effect for this variable.

The literature focusing specifically on coups d'état is scarcer. For instance, using data for 121 countries over the period 1950-1982, Londregan and Poole (1990) failed to find evidence of a significant effect of either the recent history of coups or the current propensity for a coup d'état. In contrast, Fosu (2002) found an adverse effect of coup events in Sub-Saharan African countries over the 1960-1986 period. The aforementioned study by Aisen and Veiga (2013) employs two composite indicators of regime instability that include coups d'état in their construction. The obtained coefficients show a negative and significant effect.

Overall, existing studies seem to indicate that there is a positive (negative) effect of state effectiveness (ineffectiveness) on growth. In the case of political violence, the literature suggests that different dimensions have different effects on economic growth. Thus, the overall effect may be less clear.

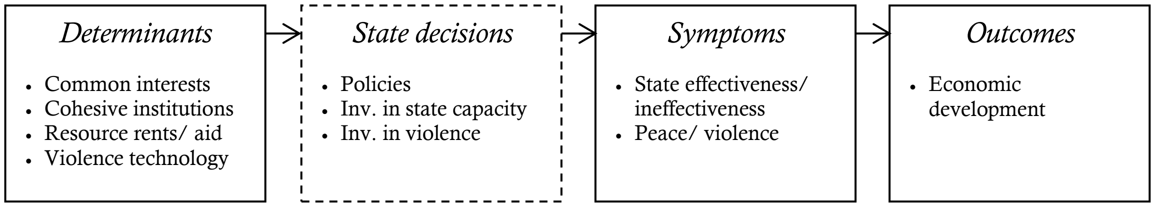
4.3. HYPOTHESES, EMPIRICAL MODEL AND DATA

4.3.1. Theoretical framework and hypotheses

Using the indices obtained from Chapter 3 that reflect the two dimensions of state fragility, I examine its effect on economic growth. I recover the terminology used in Besley and Persson (2011a), and for simplicity purposes, as well as to help the interpretation of the obtained results, I now consider state ineffectiveness, instead of state effectiveness, as one of the symptoms of state fragility, alongside political violence.

Before formulating the hypotheses being tested here, I briefly summarise their theoretical underpinnings, discussed at length in Chapter 3. According to Besley and Persson's (2011a) model of state fragility, the distinction between determinants, symptoms and outcomes can be portrayed as in Figure 14 (reproduced from Figure 2 in Chapter 3).

Figure 14. State fragility: determinants, symptoms and outcomes



This chapter tests the arrow that links the last two boxes in the figure; in other words, the effect of each symptom of state fragility on economic growth, which is used as a measure of economic development. The first two hypotheses stem from the postulate that higher levels of fragility have a detrimental effect on growth[73], and, according to the predictions from Chapter 3, can be formulated as:

H1.1: Higher levels of state ineffectiveness have a negative effect on economic growth.

H1.2: Higher levels of political violence have a negative effect on economic growth.

The main argument from Part I of this thesis is that these two symptoms of state fragility should be examined separately, and the underlying theoretical model highlights the importance of heterogeneity. Additionally, the results in Chapter 3 suggested that the two dimensions, although clearly correlated, are far from perfectly correlated. The matrix of the state resulting from this model (see Chapter 3) identifies different types of states, resulting from the combination of the two symptoms. For instance, it suggests that civil war is usually associated with weak or redistributive regimes (Besley and Persson, 2011a: 386).[74] Also, the economic performance of a weak state at peace is likely to be different from that of a repressive, but effective state. This inspired the introduction of an additional hypothesis to test whether there is an interactive effect of the two symptoms:

H2: The effect of state ineffectiveness (or political violence) on economic growth will depend on the level of political violence (or state ineffectiveness).

[73] I recall here that higher levels of state ineffectiveness and of political violence are interpreted as higher levels of state fragility.
[74] See also Fjelde and de Soysa (2009) for an overview of the literature relating state capacity and armed conflict and civil war.

4.3.2. Empirical model

The empirical basis described in this and the following sections is largely in line with the growth literature reviewed previously:

$$g_i = \alpha + \beta \log y_{i,0} + \delta X_i + \varepsilon_i \qquad (1)$$

where i indexes countries, g_i is per capita real GDP growth, α is a constant, $\log y_{i,0}$ is the logarithm of the initial level of per capital real GDP, X_i includes covariates that I motivate and discuss below when describing the data used, and ε_i represents the error term.

In order to test the hypotheses described above, I include in this formulation a term to capture state ineffectiveness and another to capture political violence. This is represented in equation (2), where si_i is the obtained index for state ineffectiveness and pv_i is the political violence index. The coefficients on state ineffectiveness and political violence, γ_1 and γ_2, measure how growth is affected by each of these dimensions.

$$g_i = \alpha + \beta \log y_{i,0} + \gamma_1 si_i + \gamma_2 pv_i + \delta X_i + \varepsilon_i \qquad (2)$$

Subsequently, I introduce the interaction term between these two variables to capture the effects described in hypothesis *H2*. This is represented in equation (3), where γ_3 allows one to examine whether the effect of state ineffectiveness, or political violence, on growth is different for different values of political violence, or state ineffectiveness.

$$g_i = \alpha + \beta \log y_{i,0} + \gamma_1 si_i + \gamma_2 pv_i + \gamma_3 si_i \times pv_i + \delta X_i + \varepsilon_i \qquad (3)$$

When compared to the studies testing the effect of state fragility on growth reviewed in the previous section, this approach differs by using two distinct indices to proxy for the dimensions of state fragility separately, and by employing a continuous measure of state fragility rather than a dummy for whether a country is fragile.

The links described and the expected signs for the coefficients of interest are represented in Table 27. The data used to test these relationships are described in the following paragraphs.

Table 27. Summary of specifications

Hypothesis	Link(s) tested	Coefficient (Expected sign)
H1.1: Higher levels of state ineffectiveness have a negative effect on economic growth. *H1.2: Higher levels of political violence have a negative effect on economic growth.*	State ineffectiveness Economic growth Political violence	γ_1 (–) γ_2 (–)
H2: The effect of state ineffectiveness (or political violence) on economic growth will depend on the level of political violence (or state ineffectiveness).	State ineffectiveness Economic growth Political violence	γ_3 (–)

4.3.3. Endogeneity

While the interest in this chapter is to test whether state fragility affects economic growth, as pointed out by Bertocchi and Guerzoni (2010), it is plausible to assume that the causality runs in the opposite direction, i.e. from growth to state fragility. Given the nature of the two variables used to proxy for state fragility, there is a risk that the use of OLS methods leads to biased regressors, for two main reasons. The first is the potential for omitted variables. For instance, it is possible that state ineffectiveness and growth respond simultaneously to an omitted factor, such as the legal framework, or the historical evolution of the nation in question (Mendez and Sepulveda, 2006).

The second reason is that, as mentioned above, there is a possibility that economic growth has an effect on state ineffectiveness. For instance, it could be the case that countries with higher rates of economic growth have more resources to fight against and control corruption (Mendez and Sepulveda, 2006: 91). It is also more likely that richer economies choose strong fiscal systems, or they have, at least, the ability to do so (Dincecco and Prado, 2012: 172). Also, income levels and income growth have been explored at length in the literature examining the causes of conflict, with some authors finding a significant relationship between the two (e.g. Collier and Hoeffler, 2004a; Miguel, Satyanath and Sergenti, 2004).[75]

In section 4.5.3, I attempt to take into account the potential for endogeneity of both state ineffectiveness and political violence by using different strategies for cross-country and

[75] See Humphreys (2003) for an overview of the links between economic factors and conflict, and Blattman and Miguel (2010) for a review of the cross-country studies examining the causes of conflict.

panel data. In the case of state ineffectiveness, I explore as possible instruments the logarithm of settler mortality, in line with the influential work by Acemoglu, Johnson and Robinson (2001), and the four variables used as instruments for social infrastructure in Hall and Jones (1999). Both strategies are applied to cross-country and panel data.

In order to overcome the potential endogeneity of political violence, I run a set of specifications considering the initial value of this variable, and alternatively I use a food price index as an instrument for this variable. Recent studies have found an empirical link between increases in food prices and incidence of political violence, such as anti-government demonstrations, riots, and civil conflict (Arezki and Bruckner, 2011; Bellemare, 2014; Rezaeedaryakenari, Landis and Thies, 2017). Again, these strategies are applied to cross-country and panel data.

When using panel data, the strategy followed in recent work pursuing similar aims is to employ dynamic panel methods, such as GMM, in both its difference and system versions (see, for instance, Aisen and Veiga, 2013). Still, the use of these methods in this chapter is precluded by data availability. Even in the case of the dataset with 5-year averaged data, only four periods are available. Bearing this in mind, I use as controls the lagged values of the time-variant explanatory variables included before, alongside the initial level of per capita GDP, the measure of geography and the three regional dummies in order to mitigate the potential endogeneity of both variables simultaneously. Finally, I follow the suggestion in Bertocchi and Guerzoni (2010) and employ as instruments the lagged values of the regressors.

4.3.4. Data

Given that the data for the index of state ineffectiveness are available only from 1996, and in order to maximise the use of the data available, the estimations in this chapter were carried out considering the period 1993-2012. The first set of results was obtained with cross-country data for 20- and 10-year horizons; panel data considering 5-year averages and 10-year averages were used later in the analysis. Table 28 summarises the different time periods used, as well as the number of countries included in each sub-sample.[76]

[76] Table C1.2 in Appendix C1 includes the lists of countries for each sub-sample.

Table 28. Different time periods and number of countries

	Reproduced dataset				
	Cross-country			Panel	
Time horizon	20-year	10-year		5-year	10-year
Sub-period(s)	1993-2012	1993-2002	2003-2012	1993-1997 1998-2002 2003-2007 2008-2012	1993-2002 2003-2012
Nr countries	92	87	80	85	92

Following the standard practice in the literature, the average of the annual growth rate of real GDP (Gross Domestic Product) is used as dependent variable. The explanatory variables of interest are state ineffectiveness and political violence. They are measured using two indices derived on the basis of the analysis described in Chapter 3. For the purposes of this chapter, PCA was applied to each set of variables separately.[77] This means that the state ineffectiveness index was obtained by applying PCA to the set of variables representing state effectiveness (described in Table 6 in Chapter 3), and then multiplying the resulting scores by -1, in order to transform this variable into a measure of state ineffectiveness. Similarly, the political violence index results from the application of PCA to the set of variables describing political violence.[78] Figures C3.1-C3.5 in Appendix C3 show the histograms obtained for these variables for each of the periods considered. Overall, one observes a bimodal distribution for state ineffectiveness, with a greater concentration of countries in the intervals of values [-6,-4] and [0,2]. The histograms for political violence show a right-skewed distribution, with the majority of countries assuming values between -2 and 0.

Figures 15-17 include the scatters for GDP per capita growth versus state ineffectiveness and political violence for the three periods considered. They suggest a negative relationship between growth rates and state ineffectiveness in the periods 1993-2012 and 1993-2002, although it is more clearly visible for the latter period. When the period 2003-2012 is considered it is hard to identify any clear relationship between the two variables. In all three periods, there is a concentration of the countries with lower levels of state ineffectiveness in similar rates of growth. The relationship between growth rates

[77] In the previous chapter, applying PCA to all the selected indicators allowed me to avoid making an *ad hoc* distinction between the two symptoms. However, given that the results concurred to the view that the two symptoms of fragility should be considered separately, the application of PCA to the variables used to proxy for each of them separately seems natural and appropriate for the analysis in this chapter.

[78] In the application of PCA, and unlike the analysis in Chapter 3, no rotation procedure was employed, and each of the fragility indices results from the scores obtained when considering the first principal component. The eigenvectors resulting from applying this approach are included in Table C3.1 in Appendix C3.

Figure 15. GDP per capita growth rates versus the indices of state ineffectiveness and political violence, 1993-2012

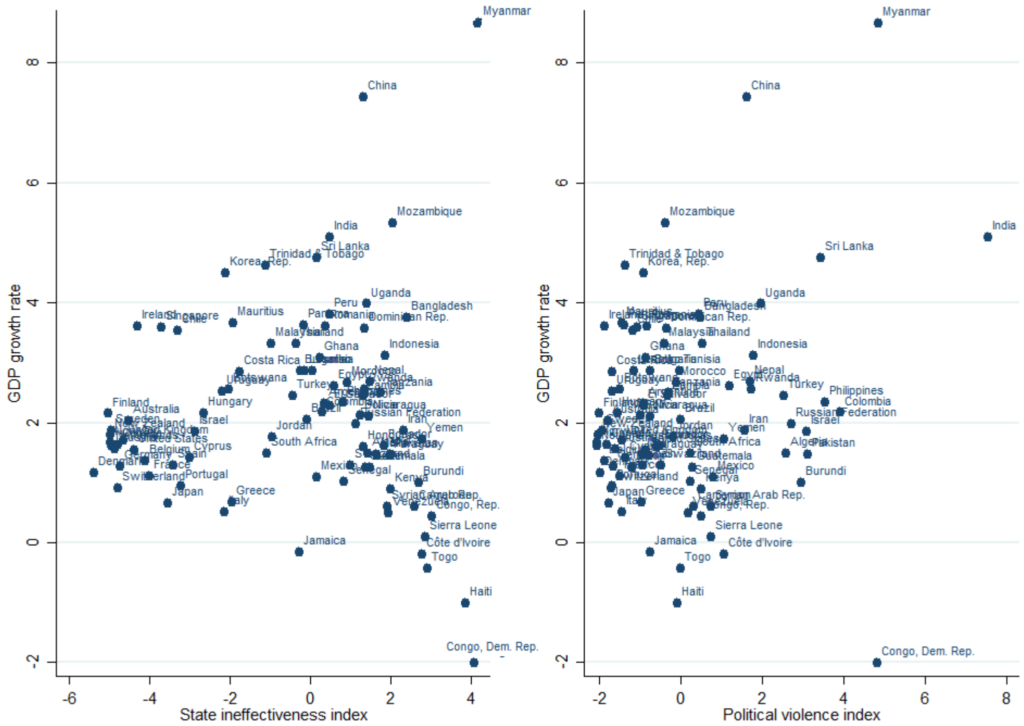


Figure 16. GDP per capita growth rates versus the indices of state ineffectiveness and political violence, 1993-2002

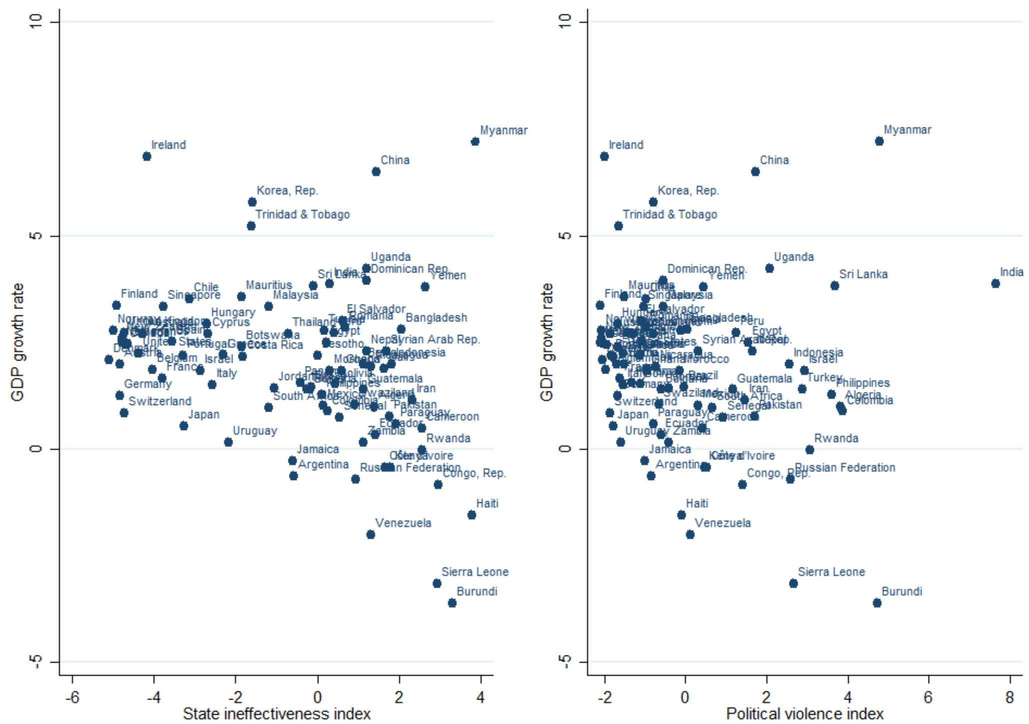
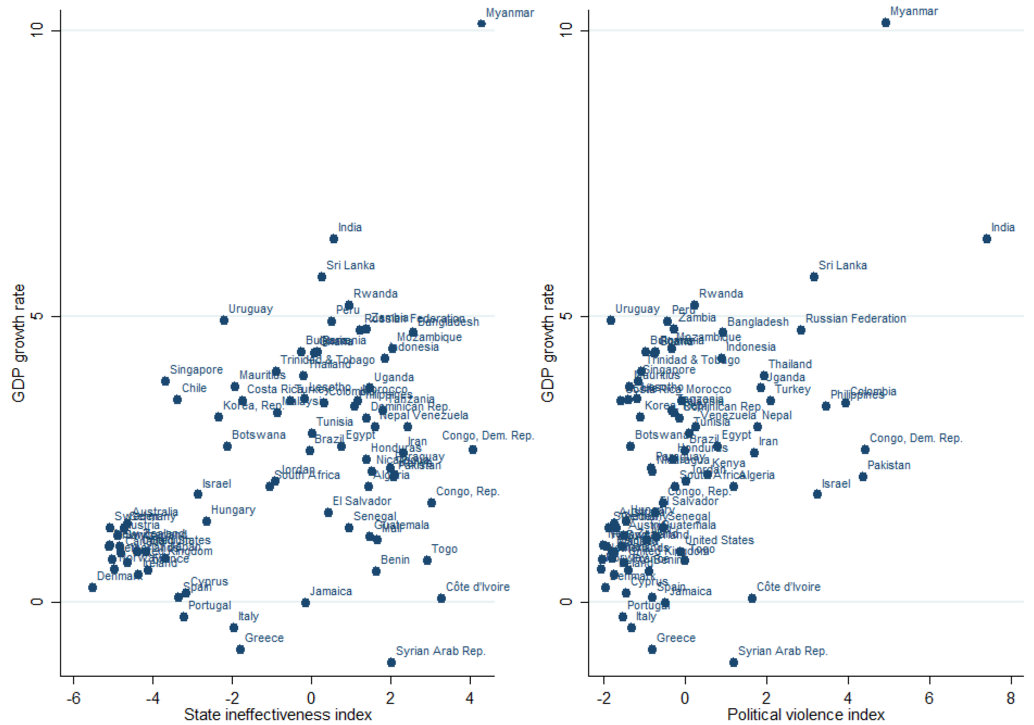


Figure 17. GDP per capita growth rates versus the indices of state ineffectiveness and political violence, 2003-2012



and political violence is harder to describe. Countries with low levels of political violence are dispersed in terms of their position in terms of growth when one observes the 20-year period. The data representation for the first decade gives some indication of a negative relationship, but, in contrast, for period 2003-2012, the point represented suggest a counter-intuitive positive correlation.

As highlighted in the previous section, there is no definite list of growth determinants. Still, inspired by the growth literature referred to above, namely by Bosworth and Collins' (2003) and Sala-i-Martin, Doppelhofer and Miller's (2004) work, the following were chosen as control variables:

- Initial level of per capita GDP: logarithm of per capita GDP in the beginning of the relevant period in both the cross-country and the panel datasets. This is used to capture convergence, which corresponds to a negative coefficient;
- Education: percentage of the population aged 15 and over for whom the secondary level is the highest level of education completed, averaged across the relevant period. Higher levels of education are expected to be positively related to higher levels of growth;
- Terms of trade: change in the net barter terms of trade index. Cross-country estimations also include the variability (measured by the standard deviation) of

the net barter terms of trade index. The coefficient of the change in terms of trade is expected to be positive, whereas one expects a negative coefficient for the variability;

- Measure of geography: time-invariant measure from Bosworth and Collins (2003) that averages the number of frost days and tropical land area. Standard deviations of the two measures are used and then assigned equal weights. Given that the first is positively correlated with growth, whereas the second has a negative correlation, the weights assigned are -0.5 and +0.5, respectively. Higher values of this measure, represent better geography; thus, a positive coefficient is expected;
- Inflation: logarithm of (1+inflation/100) in the beginning of the relevant period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. The coefficient is expected to be negative, given that high inflation has a detrimental effect on economic growth;
- Budget balance: cash surplus or deficit (% of GDP) in the beginning of the relevant period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. In general, it is more challenging to raise funds to finance expenditure if the country has a high budget deficit, so a negative coefficient is expected;
- Trade policy: Sachs and Warner's (1995) openness index in the beginning of the relevant period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. Based on the hypothesis that trade openness promotes economic growth, the coefficient is expected to be positive.

In addition to these, regional dummies were included for Sub-Saharan Africa, East Asia, and Latin America, as well as time dummies in the case of panel regressions. Two additional variables were considered for the analysis, namely the ICRG as a measure of institutional quality and life expectancy. The full details of the sources and construction of the variables are included in Table C1.1 in Appendix C1, and Tables C1.3 and C1.4 include the descriptive statistics for the datasets used. The growth rates vary significantly among the sample of countries and depending on the periods considered. For instance, when considering the 10-year period 1993-2002 the growth rates range from -3.61% to 7.21%, whereas for the period 2003-2012 they range from -1.07% to 10.12%. There is also a noticeable variation in the levels of state ineffectiveness and political violence. In the case of the first, the average values across the sample range between around -0.4 and -0.7, with minimum values being as low as -5.5 and maximum values reaching 4.3. Considering the political violence index, one observes average values across the samples between -0.03 and 0.08, and similar amplitudes between the minimum and maximum values, which are around -2 and 7.6, respectively. The following sections provide more detail about the choice of variables.

4.4. DIAGNOSTIC ANALYSIS

4.4.1. Multicollinearity

In line with previous work, life expectancy and the ICRG indicator of quality of government were initially considered in the analysis. However, the potentially high correlation between these variables and some of the other explanatory variables included, namely state ineffectiveness, raised some concerns over multicollinearity. I have followed two procedures to investigate this possibility. First, I considered the pairwise correlations between the variables. Second, and following the suggestion of Kennedy (2008: 199), I used the inverse of the correlation matrix to detect multicollinearity, and compute the variance inflation factors, VIF_i (i.e. its diagonal elements). Two rules of thumb are usually applied to detect harmful collinearity: i) $VIF_i > 10$; and ii) the mean of all the VIFs is considerably larger than 1 (Kennedy, 2008: 199; StataCorp., 2013).

The results obtained using the cross-country datasets confirmed the possibility for multicollinearity. The correlation between the ICRG index and the state ineffectiveness index was high in all the periods considered (-0.936 when the dataset for period 1993-2012 was used, -0.925 for period 1993-2002, and -0.927 for period 2003-2012), which motivated the exclusion of this variable from the main analysis.[79] In terms of life expectancy, the pairwise correlations highlight a negative correlation with the state ineffectiveness index, but lower than -0.7 in all the periods considered.

The second of the aforementioned methods was used to further explore whether including this variable would be problematic. The diagnostic tests for multicollinearity indicated a VIF of 7.02 for life expectancy for the 20-year period, and a mean VIF of 3.19. The values were slightly lower for period 1993-2002, with the VIF value for life expectancy being 6.39, and a mean VIF of 3.03. When considering the second 10-year

[79] In section 4.5.2 I discuss the results obtained when this variable is included.

period 2003-2012, the values were higher than before. The VIF for life expectancy was 12.73, and the mean VIF in this case was 4.13. The VIF for the state ineffectiveness index was also quite high, and, with the exception of the last of the periods considered, similar to that of life expectancy. In light of these results, I have decided not to consider life expectancy in the main analysis.[80]

Focusing on the remaining controls and the variables of interest, the observation of the correlation matrices (Tables C2.1-C2.3 in Appendix C2) does not suggest much reason for concern. As a rule of thumb, absolute values below 0.8 are not usually considered as indicators of potential collinearity. Given that most values are below this threshold in the three time horizons, I did not consider it to pose any problems. The only exceptions are the correlation coefficients for the pair of variables state ineffectiveness and GDP per capita, which are above 0.8 in the three periods. However, these are both crucial for the analysis, so they were included.

Still, I use the second procedure to confirm this conclusion. The obtained values (represented in Table C2.6 in Appendix C2) show that no VIF is greater than 10, but the mean VIF is 2.69 for period 1993-2012, 2.60 for period 1993-2002, and 2.83 for period 2003-2012, which is slightly above the unit. Despite these results, there seems to be no further reason for concern.

The same analysis was also carried out to the panel data covering the full time period 1993-2012. In line with previous studies employing similar lists of variables (Rajan and Subramanian, 2005), the standard deviation of the terms of trade was not included with this data structure. Again, the ICRG was highly correlated with the state ineffectiveness index (with a coefficient of -0.907 when 5-year periods were considered and -0.920 for the dataset with 10-year periods), and it was thus excluded from the analysis.[81] The obtained correlation coefficients between life expectancy and state ineffectiveness were 0.770 and 0.750 for the 5-year period dataset and the 10-year period data, respectively.

When looking at the levels obtained for the VIF, in the case of the data with 5-year averages, the value for life expectancy was 7.72, and the mean VIF was 3.07. The mean VIF for the panel dataset obtained with 10-year averages is 3.23, with a value of 8.07 for

[80] Basic OLS regressions were run including life expectancy, and the coefficient obtained for this variable was significant at 10% level in only one of the three specifications. Additionally, the results obtained when life expectancy is used instead of education are briefly discussed in section 4.5.2.

[81] In section 4.5.2 I discuss the results obtained when this variable is included.

life expectancy. Similarly to the decision made for cross-country data, life expectancy was left out of the main analysis.[82]

After considering these changes, the correlation matrices for the two datasets did not suggest further reason for concern, with the exception being again the correlation coefficients between state ineffectiveness and the logarithm of per capita GDP.[83] Furthermore, similarly to the cross-country datasets, the analysis of the VIFs (also represented in Appendix C2, Table C2.7) did not show any individual value above 10 and the mean VIFs were 2.40 and 2.57 for the datasets with 5-year averages and 10-year averages, respectively.

4.4.2. Outliers

A second aspect that warrants further investigation in this type of analysis is the potential for the existence of outliers. I adopt the Hadi (1992) procedure for identifying multiple outliers as implemented by Roodman (2007a) to the partial estimation of growth and a regressor of interest.[84] This method starts by measuring the distance between data points and the main body of the data, and then applies an interactive process that decreases the sample to eliminate distant data points (Lessmann and Markwardt, 2012: 1734).

Table 29 represents the results obtained after applying this procedure to the two main regressors of interest – state ineffectiveness and political violence – to the cross-country and panel data, respectively. The results vary with the dataset considered, with India being identified as an outlier in the three cross-country datasets.[85] In the case of panel data, observations for Myanmar and Burundi are identified as potential outliers in the 5-year and 10-year averaged datasets, respectively.

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[82] Once again I considered a regression specification including all control variables and life expectancy for the three periods, and none of the coefficients obtained for this variable were significant. However, the results obtained when life expectancy is used instead of education are briefly discussed in section 4.5.2.

[83] The correlation matrices for the panel data can be found in Appendix C2, Tables C2.4 and C2.5.

[84] This consists on the partial estimations of growth and a regressor of interest on the remaining regressors, and the application of the Hadi (1992) procedure to the residuals obtained from these estimations. In addition to this procedure, I make use of Stata's command *bacon* (Weber, 2010), a recently presented alternative to the *hadimvo* command (which applies the Hadi's procedure) to identify outliers in multivariate data.

[85] The observation of the scatter plots comparing the residuals of the obtained estimations concurs to the conclusions presented in Table 29.

Table 29. Outliers identified with the Hadi procedure

	Cross-country			Panel	
	20-year	10-year		5-year	10-year
	1993-2012	1993-2002	2003-2012		
SII	0	0	0	Myanmar (2003-2007)	0
PVI	Colombia India Israel	India	Colombia India	0	Burundi (1993-2002)

Notes: 0.05 was used as the cut-off significance level for both when applying the Hadi procedure and using the *bacon* command. The latter did not identify any outliers across the different datasets. Periods represented in parenthesis for the results with panel data.

Additionally, I consider the potential outliers in terms of growth rates by using a graphical procedure that consists in the observation of a leverage-versus-squared-residual plot. This is a graph of leverage against the (normalized) residuals squared and includes two lines showing the average values for these two dimensions. Any points lying above the horizontal line have a leverage value which is higher than average, and any points lying to the right of the vertical line have residuals which are higher than average (StataCorp., 2013). The first of these groups of points causes the most concern. Although there is no consensus on what threshold level to consider for leverage values, some consider as a rule of thumb that values higher than 0.5 constitute a reason for concern. Others use as a selection criterion values of the leverage higher than 2xK/N, where K is the number of parameters (including the intercept) and N is the sample size. Given that the value of the latter is close to 0.4 in the samples considered here, and it is also lower than 0.5, I consider this as the threshold level. The plots are not included here, but Table 30 lists the countries highlighted with this procedure.

Table 30. Outliers identified for economic growth

	Cross-country			Panel	
	20-year	10-year		5-year	10-year
	1993-2012	1993-2002	2003-2012		
Economic growth	Congo, D. Rep.	Brazil	Algeria India Russia Venezuela	Brazil (1993-1997)	Brazil (1993-2002)

Notes: These countries were selected based on the observation of the leverage-versus-squared-residual plot and by considering levels of the leverage higher than 0.4.

For the following analysis, I opt to consider the whole sample with available data. However, bearing in mind the results of this preliminary analysis, I discuss the changes when the potential outliers are excluded from the sample in section 4.5.2.

4.5. RESULTS ANALYSIS

This section presents the results obtained after estimating the empirical models discussed in subsection 4.4.1, beginning with the regressions estimated with OLS, using both cross-country and panel data, in subsection 4.5.1. These results are then submitted to a battery of robustness checks in subsection 4.5.2, and subsection 4.5.3 presents different alternatives to overcoming the potential endogeneity of state ineffectiveness and political violence. The final subsection further explores the data by looking at the results from spline regressions. Table 31 summarises the information contained in the main tables, clarifying the hypotheses tested, and respective coefficients of interest, as well as the variables included, and the time periods and horizons considered.[86]

Table 31. Summary of the tables with the main results

	Baseline				Robustness checks						Endogeneity				
					Outliers				Alt controls						
Estimation method	OLS				OLS						IV			OLS	
Table	**34**		**35**		**39**		**40**		**41 43**	**42 44**	**48**	**49**	**51**	**50**	**52 53**
Hypothesis, equation, coeff.															
H1, (2), β_3 and β_4	X		X		X		X		X	X	X	X	X	X	X
H2, (3), β_5		X		X		X		X							
Variables															
State ineffectiveness (SII)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Political violence (PVI)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SII x PVI		X		X		X		X							
Cross-country															
20-year: 1993-12	X	X			X	X			X		X		X	X	
10-year: 1993-02; 2003-12	X	X			X	X			X		X		X	X	
Panel															
5-year			X	X			X	X		X		X	X	X	X
10-year			X	X			X	X		X		X	X	X	X

In the baseline regressions, the first set of results includes a basic growth equation to which I added the index of state ineffectiveness and the index of political violence, and subsequently their interaction. The cross-country datasets consider two time horizons: a 20-year period is used first (1993-2012); and two 10-year periods are then considered in turn (1993-2002 and 2003-2012). The panel datasets were obtained using 5-year averages and 10-year averages, respectively.

[86] I refer back to Table 27 for a summary of the hypotheses and coefficients of interest.

4.5.1. Baseline results

a) Cross-country estimates

I begin the analysis by using the cross-country data and considering the two time horizons described before. The results are represented in Table 32.

Table 32. Cross-country OLS estimations, 1993-2012

	Dependent variable: real GDP per capita growth					
	20-year		10-year			
	1993-2012		1993-2002		2003-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
Initial pc GDP, log	-1.410***	-1.437***	-1.221***	-1.228***	-1.484***	-1.532***
	(0.258)	(0.244)	(0.285)	(0.277)	(0.226)	(0.210)
Education	0.0314*	0.0300	0.0185	0.0176	0.0451**	0.0437**
	(0.0187)	(0.0188)	(0.0151)	(0.0151)	(0.0182)	(0.0179)
Terms of trade growth	0.00530	0.00531	-0.112*	-0.109*	0.00331	0.00371
	(0.00536)	(0.00530)	(0.0660)	(0.0648)	(0.00585)	(0.00573)
St. dev. terms of trade	0.00387	0.00479	0.0399	0.0447	0.0171	0.0143
	(0.00990)	(0.00986)	(0.0399)	(0.0369)	(0.0145)	(0.0140)
Geography	0.231	0.234	-0.0326	-0.0113	-0.236	-0.193
	(0.260)	(0.257)	(0.288)	(0.290)	(0.236)	(0.228)
Initial inflation	-0.557	-0.473	-0.287	-0.326	19.93***	21.31***
	(0.467)	(0.479)	(0.448)	(0.470)	(4.108)	(4.215)
Initial budget balance	0.0674	0.0638	0.0551	0.0470	0.0967**	0.107***
	(0.0421)	(0.0419)	(0.0464)	(0.0473)	(0.0368)	(0.0351)
Initial trade policy	0.236	0.153	1.080**	0.971**	0.155	-0.110
	(0.514)	(0.538)	(0.465)	(0.475)	(0.563)	(0.518)
Sub-Saharan Africa	-1.279***	-1.316***	-2.558***	-2.551***	-1.187**	-1.198**
	(0.477)	(0.462)	(0.685)	(0.687)	(0.542)	(0.494)
East Asia	1.127	1.204*	0.404	0.478	1.063**	1.218***
	(0.724)	(0.685)	(0.806)	(0.831)	(0.426)	(0.405)
Latin America	0.272	0.241	-1.227**	-1.223**	-0.125	-0.164
	(0.440)	(0.441)	(0.558)	(0.558)	(0.534)	(0.530)
State ineffectiveness	-0.303***	-0.344**	-0.382***	-0.416***	-0.375***	-0.446***
	(0.110)	(0.146)	(0.144)	(0.145)	(0.118)	(0.106)
Political violence	0.183*	0.186*	-0.0999	-0.102	0.280***	0.302***
	(0.0980)	(0.0968)	(0.113)	(0.113)	(0.0907)	(0.0789)
SI x PV		-0.0275		-0.0282		-0.0579
		(0.0782)		(0.0844)		(0.0406)
Constant	13.88***	14.24***	11.83***	12.01***	13.08***	13.86***
	(2.387)	(2.272)	(2.598)	(2.452)	(2.050)	(1.941)
Observations	92	92	87	87	80	80
R^2	0.456	0.459	0.456	0.458	0.663	0.675
Adj. R^2	0.365	0.361	0.359	0.352	0.597	0.606

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Columns with odd numbers were obtained with the baseline specification, with the goal of testing *H1*, whereas even numbered columns result from adding the interaction between state ineffectiveness and political violence, in order to test *H2*.[87] I ignore the endogeneity concerns for the moment, and describe the results obtained with OLS.

[87] A complete description of these variables and data sources is in Table C1.1, in Appendix C1.

Beginning with the controls used, the hypothesis of convergence is confirmed by the negative and significant coefficient for the initial level of real per capita GDP.[88] The coefficient for education shows a positive effect, which is significant in three of the specifications considered. Among the remaining variables, when period 1993-2002 is considered, the coefficients for the change in terms of trade and the initial level of trade policy show, respectively, a significant negative and positive effect on growth. The coefficients for inflation and the initial level of the budget balance show a positive and significant effect of these variables on economic growth, when the 2003-2012 period is considered. With the exception of inflation, the signs obtained for these variables are in line with the expected.

The regional dummy for Sub-Saharan African countries indicates a negative and significant effect in all the specifications considered, whereas the East Asia dummy shows a positive effect, which is significant in three specifications, and, in particular, when period 2003-2012 is used. The dummy for Latin America captures a negative and significant regional effect only when the 10-year horizon from 1993 to 2002 is considered.

Turning now to the variables of interest, state ineffectiveness has a negative and significant effect on economic growth in all specifications. This is in line with the theoretical predictions and with previous related work (as discussed in section 4.2). For instance, for period 1993-2012, column (1), the estimated coefficient suggests that, if the position of a country in terms of state ineffectiveness moves from the 25th percentile to the 75th percentile, the state ineffectiveness index would rise by approximately 3.19, from -1.28 to 1.91. If the state ineffectiveness index did rise by this amount, then growth would fall by almost 1 percentage point.

In contrast with the intuition from theory, the coefficient for political violence reveals a positive and significant effect when the 20-year time horizon is considered and when

[88] According to the growth empirics literature, there is β-convergence when the coefficient for initial per capita income is below 0 and many cross-section studies find estimated convergence rates of about 2% per year (Durlauf, Johnson and Temple, 2005: 586). Applying the formula included in Barro and Sala-i-Martin (2004: 517), the results in this chapter concur with this hypothesis, even though the rates of convergence are slightly below this value. Considering the coefficients on Table 32, one obtains rates of: 1.66% and 1.69% for the period 1993-2012; 1.3% and 1.31% for period 1993-2002; and 1.61% and 1.66% for period 2003-2012. As discussed in Durlauf, Johnson and Temple (2005: 586), the literature on convergence has focused on samples of countries that are more homogeneous than the ones presented in the paper (e.g. OECD countries, US states, Swedish counties, Japanese prefectures, or regions of Europe). In addition, the controls used in the early studies differ from the ones used in this chapter. Finally, the estimated coefficients are in line with those obtained with more recent studies following similar approaches, namely Rajan and Subramanian (2008).

data for the 10-year period 2003-2012 are used, but it is negative and non-significant with data for the period 1993-2002. These conclusions are maintained when the interaction term between these two indices is included. There are minor changes in the magnitude of the coefficients, but, in general, the significance levels remain the same.

Finally, I discuss the results obtained when testing the hypothesis that there is an interactive effect between state ineffectiveness and political violence. The results in columns (2), (4), and (6) do not suggest that there is a significant interactive effect. The magnitude of the coefficients is similar across specifications and they all exhibit a negative sign, but none is significant. Additionally, the inclusion of this term does not cause any major changes in the sign, significance levels, and magnitudes of the coefficients of either the variables of interest or the control variables.

b) Panel estimates

I turn now to the evidence on the impact of state fragility on growth obtained using panel data, considering the 5-year and 10-year averages, represented in Table 33. Columns (1) and (3) examine the effect of the two symptoms of state fragility on growth, thus testing hypothesis *H1*, using equation (2). Columns (2) and (4) add the interaction between these two variables to test *H2*, using equation (3).

Starting with the 5-year averaged data, the expected negative and significant coefficient for the initial level of GDP is confirmed. The results suggest a positive and significant effect of education, although of small magnitude. Against the prediction from theory, one finds a positive and significant effect of inflation. Similarly, the results indicate that there is a positive and significant link between budget balance and economic growth. In terms of the regional variables, the only significant coefficients demonstrate a negative effect for countries in Sub-Saharan Africa.

Turning now to the variables of interest, the expected negative effect of state ineffectiveness persists when panel data are considered. However, it loses significance after the inclusion of the interaction term with political violence. Regarding the latter variable, the obtained coefficient is positive, but small in magnitude and not significant. Finally, the result for the interaction term does not lend support to the existence of an interactive effect of these two variables on growth.

Table 33. Panel OLS estimations, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages		10-year averages	
	(1)	(2)	(3)	(4)
Initial pc GDP, log	-1.226***	-1.187***	-1.572***	-1.577***
	(0.327)	(0.322)	(0.235)	(0.221)
Education	0.0407**	0.0428**	0.0375***	0.0372***
	(0.0176)	(0.0174)	(0.0143)	(0.0141)
Terms of trade growth	0.00317	0.00281	-0.00233	-0.00224
	(0.0162)	(0.0163)	(0.00828)	(0.00821)
Geography	0.127	0.107	-0.146	-0.141
	(0.240)	(0.249)	(0.219)	(0.222)
Inflation	1.138**	1.078**	0.189	0.183
	(0.522)	(0.441)	(0.528)	(0.547)
Budget balance	0.130***	0.125***	0.124***	0.124***
	(0.0462)	(0.0475)	(0.0366)	(0.0364)
Trade policy	-0.407	-0.253	0.0648	0.0260
	(0.734)	(0.690)	(0.538)	(0.468)
Sub-Saharan Africa	-1.929***	-1.887***	-2.158***	-2.157***
	(0.538)	(0.548)	(0.569)	(0.569)
East Asia	0.912	0.826	0.686	0.703
	(0.651)	(0.583)	(0.575)	(0.520)
Latin America	-0.457	-0.429	-0.501	-0.502
	(0.406)	(0.418)	(0.402)	(0.403)
State ineffectiveness	-0.238*	-0.190	-0.322***	-0.331***
	(0.126)	(0.145)	(0.0990)	(0.105)
Political violence	0.0754	0.0689	0.0545	0.0560
	(0.106)	(0.106)	(0.0977)	(0.0933)
SI x PV		0.0407		-0.00741
		(0.0700)		(0.0697)
Constant	13.05***	12.05***	16.04***	16.14***
	(3.102)	(3.046)	(2.384)	(2.099)
Observations	198	198	167	167
R^2	0.325	0.328	0.322	0.322
Adj. R^2	0.273	0.273	0.264	0.260

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time dummies also included in the regressions.

Considering the 10-year averaged data, with the exception of inflation, the obtained results show similar results for the coefficients of the control variables that are significant. The adverse effect of state ineffectiveness found previously holds when 10-year averages are considered, and also when the interaction term is added. The coefficient for political violence remains roughly the same, with a small reduction in magnitude, but still non-significant. The inclusion of the state ineffectiveness x political violence term does not cause major variations to the coefficients of the two variables, and despite the change in sign, it remains small in magnitude and non-significant.

The discussed coefficients were simply estimated by OLS, and thus not recognizing the panel structure of the data. Given that using a panel structure allows one to account for individual heterogeneity, I explore this possibility further. Two tests provide some support for this decision. First, the results of the Breusch and Pagan Lagrange multiplier test (Breusch and Pagan, 1980) applied to the 5-year averages dataset indicated that one can reject the null hypothesis that the variances across entities are zero, thus suggesting that random effects is more appropriate when compared to simple OLS. Still, one could not reject the null hypothesis for the case of 10-year averages. In other words, there is no evidence of significant differences across countries in this case, and therefore one can run a simple OLS regression. Second, the F-test that the observed and unobserved fixed effects are equal to zero indicated that one rejects the null hypothesis, suggesting the use of the fixed effects estimator.

One of the central issues when estimating panel data is whether the unobserved unit effects and time effects must be treated as random or fixed. The result of the Hausman test, frequently used to compare fixed effects and random effects, led to the rejection of the null hypothesis that the estimated coefficient with random effects is efficient, thus, deeming fixed effects as the preferred model.[89] In light of these results (summarised in Table 34), in what follows, I explore the coefficients obtained when panel structure is considered and the fixed-effects (FE) estimator is employed. These are presented in Table 35.

Table 34. Diagnostic tests for panel data estimators

	p-values	
	5-year averages	10-year averages
Breusch and Pagan Lagrangian multiplier test	0.0001	0.1658
F-test of $u_i = 0$	0.0000	0.0000
Hausman test	0.0026	0.0000

In general there is a noticeable loss in the significance level of the explanatory variables, with only the logarithm of initial real per capita GDP and inflation holding a significant effect on growth in both datasets. When 5-year averaged data are considered, one notices a loss of significance of the negative coefficient for state ineffectiveness, whereas the term for political violence is now negative, but still non-significant. In the case of 10-year averages, the sign of the coefficient for state ineffectiveness changed and it also lost significance. Similarly to the 5-year dataset, political violence exhibits a negative coefficient, which is, however, non-significant. The interaction term between these two variables is positive, but not significant in both datasets.

[89] The Mundlak (1978) approach was also considered as an alternative to the Hausman test. This method estimates random effect regressions adding group-means of independent variables to the model. The results of the test for both the 5-year and 10-year averaged datasets rejected the null hypothesis that the panel-level means are jointly zero, lending support to the use of fixed effects.

Table 35. Panel FE estimations, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages		10-year averages	
	(1)	(2)	(3)	(4)
Initial pc GDP, log	-8.273***	-8.517***	-6.408***	-6.546***
	(2.560)	(2.555)	(1.112)	(1.141)
Education	0.0100	0.00357	-0.0287	-0.0310
	(0.0391)	(0.0392)	(0.0278)	(0.0268)
Terms of trade growth	-0.00484	-0.00674	-0.000116	-0.000498
	(0.0102)	(0.00969)	(0.00590)	(0.00600)
Inflation	0.916***	0.912***	-1.224*	-1.120*
	(0.283)	(0.277)	(0.694)	(0.674)
Budget balance	0.0927	0.0923	0.0358	0.0374
	(0.0789)	(0.0727)	(0.0554)	(0.0555)
Trade policy	-0.589	-0.689	-1.179	-1.257
	(1.165)	(1.110)	(0.931)	(0.887)
State ineffectiveness	-0.403	-0.585	0.767	0.698
	(0.623)	(0.654)	(0.514)	(0.533)
Political violence	-0.0771	-0.156	-0.206	-0.276
	(0.291)	(0.286)	(0.319)	(0.365)
SI x PV		0.182		0.0808
		(0.144)		(0.149)
Constant	75.96***	77.81***	61.35***	62.37***
	(22.50)	(22.44)	(10.04)	(10.24)
Observations	228	228	197	197
R^2	0.395	0.404	0.518	0.521
Nr of countries	101	101	108	108
Adj. R^2	0.367	0.374	0.495	0.495

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time dummies also included in the regressions.

Despite the changes observed when the panel structure of the data was considered, these results should be regarded with caution. Fixed-effects estimators are useful when one wants to analyze the impact of variables that vary over time, but a recognized problem in the literature is that they will not be appropriate for variables that change slowly over time. This means that the limited time variation of state ineffectiveness and political violence may be the reason for the lack of a significant effect for these two indices. [90]

c) Summary of results

Before moving to the discussion of the robustness of the estimated coefficients, I summarise the main conclusions from this section, briefly described in Table 36. Given the aforementioned reservations about the use of a panel structure, I focus on the results obtained with OLS.

[90] An analysis of the variation of these variables over time (see Table C3.3. in Appendix C) indicated that most variation is explained by differences between rather than within countries.

Table 36. Summary of baseline results

	Cross-country	Panel*
SI	The coefficient is negative and significant in all specifications.	Negative and significant in all specifications, but one of them.
PV	Positive and significant coefficient for periods 1993-2012 and 2003-2012, but negative and non-significant for period 1993-2002.	The coefficient is positive, but small in magnitude and never significant.
SI x PV	Negative coefficient, but it is not significant in any specification.	The sign of the coefficient changes depending on the specification considered, but it is not significant in any of them.

Notes: *Refers to the results obtained with pooled OLS.

The evidence from the cross-country data suggests a negative effect of state ineffectiveness on economic growth, in line with previous studies examining the link between related concepts (such as state capacity and institutions) and economic growth. It is interesting to note the significant positive coefficient for political violence in some of the cross-country regressions, which, against the prediction, suggests that higher levels of political violence will contribute to higher economic growth. However, it is important to highlight that the sign of the coefficient and its significance level change dramatically with different data specifications. Finally, the lack of statistical significance of the coefficient for the interaction term seems to discard *H2*, showing no evidence that there is an interactive effect of these two variables on economic growth.

4.5.2. Robustness checks

a) Excluding outliers

The results of the preliminary analysis of potential outliers presented in section 4.4.2, and summarised in Tables 29 and 30, called for closer scrutiny of the influence of some observations on the obtained results. Table 37 corresponds to the analysis represented in Table 32, excluding all of the potential outliers identified. More specifically, it includes the results for the main variables of interest obtained by applying OLS to the cross-country datasets i) for period 1993-2012, for the original sample of countries, but excluding Israel, Colombia, India and Dem. Rep. Congo; ii) for period 1993-2002, excluding India and Brazil; iii) and for period 2003-2012, for the original sample excluding Colombia and India, as well as Algeria, Russia and Venezuela.

The main differences in the obtained results lie in the coefficients for political violence, which remain positive but lose significance when using the 20-year period, and retain significance only in the specification after the interaction term is added for the decade

Table 37. Cross-country OLS estimations after excluding outliers, 1993-2012

	Dependent variable: real GDP per capita growth					
	20-year		10-year			
	1993-2012[1]		1993-2002[2]		2003-2012[3]	
	(1)	(2)	(3)	(4)	(5)	(6)
State ineffectiveness	-0.391***	-0.347**	-0.240	-0.269*	-0.344**	-0.404***
	(0.123)	(0.166)	(0.160)	(0.145)	(0.130)	(0.112)
Political violence	0.270	0.247	-0.176	-0.174	0.182	0.207**
	(0.175)	(0.165)	(0.127)	(0.123)	(0.123)	(0.0988)
SI x PV		0.0287		-0.0220		-0.0428
		(0.0952)		(0.0809)		(0.0359)
Observations	88	88	85	85	75	75
R^2	0.464	0.466	0.471	0.473	0.652	0.659
Adj. R^2	0.370	0.364	0.374	0.367	0.578	0.579

Notes: The control variables included are: logarithm of the initial level of income per capita, the growth and variability of terms of trade, a measure of geography, initial level of inflation, initial budget balance, initial policy, and regional dummies for Sub-Saharan Africa, East Asia, and Latin America. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. . [1]Considers the original sample of countries and excludes Israel, Colombia, India and Dem. Rep. Congo. [2]Considers the original sample of countries and excludes India and Brazil. [3]Considers the original sample of countries and excludes Algeria, Colombia, India, Russia and Venezuela.

2003-2012. The changes are smaller for period 1993-2002, with the term remaining negative and non-significant.

Turning now to the results for state ineffectiveness, the obtained coefficients are similar, although slightly smaller in magnitude, in most cases, when compared to those obtained with the full sample of countries. There is an overall decrease in the significance level, but, with the exception of one specification, all of the coefficients remain significant. Finally, the results for the interaction term between the two variables remain roughly the same, although there is a change in the sign for the coefficient in period 1993-2012.

The same principles were applied to panel data. According to the conclusions from the preliminary analysis included in Tables 29 and 30, the observations for Myanmar in 2003-2007 and Brazil in 1993-1997 were identified as potential outliers when 5-year averaged data are considered. Also, the observations for Burundi and Brazil in period 1993-2002 were signalled as potential outliers in the dataset using 10-year averages. Table 38 represents the coefficients obtained after dropping these observations from the datasets and applying OLS methods.

When comparing the obtained results with those resulting from the full sample, in the case of the dataset with 5-year averages, one notices that the negative effect of state ineffectiveness is now significant even when the interaction term is included. The results for the alternative dataset remain virtually the same for this variable. In the case of the coefficient for political violence, there are only some changes in magnitude, but it remains not significant in any specification. The same applies for the interactive effect

Table 38. Panel OLS estimations after excluding outliers, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages[1]		10-year averages[2]	
	(1)	(2)	(3)	(4)
State ineffectiveness	-0.254*	-0.274**	-0.337***	-0.302***
	(0.133)	(0.132)	(0.100)	(0.108)
Political violence	0.0628	0.0646	0.112	0.110
	(0.107)	(0.106)	(0.0809)	(0.0814)
SI x PV		-0.0157		0.0310
		(0.0534)		(0.0585)
Observations	196	196	165	165
R^2	0.306	0.307	0.346	0.350
Adj. R^2	0.253	0.249	0.290	0.289

Notes: The control variables included are: logarithm of the initial level of income per capita, growth of terms of trade, a measure of geography, inflation, budget balance, policy, and regional dummies for Sub-Saharan Africa, East Asia, and Latin America. Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [1]Considers the original sample of countries and excludes the observation for Myanmar in 2003-2007 and Brazil in 1993-1997. [2]Considers the original sample of countries and excludes the observation for Burundi in 1993-2002 and Brazil in 1993-2002.

between these two variables. Despite the changes in sign, there is no indication of a significant effect on growth.

b) Alternative controls

As mentioned in the literature review in section 4.2, there is no definite list of controls, and different authors use different sets of explanatory variables. The following paragraphs describe the results obtained after I allowed for some changes in the set of controls used.

Firstly, I added the following three additional covariates, which can be frequently found, for instance, in the literature examining the link between aid and growth (e.g. Rajan and Subramanian, 2008):

- M2 as a ratio of GDP: averages over the relevant time periods of money and quasi money (M2) expressed as a percentage of GDP. This is a proxy for the level of depth of the financial system, and, thus, a positive sign is expected;
- Revolutions: average number of revolutions, defined as "any illegal or forced change in the top government elite, any attempt at such change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government" (Banks and Wilson, 2016). It is expected to have a negative coefficient in the model;
- Ethnic fractionalization: average of Alesina et al.'s (2003) measure of ethnic fractionalization over the period. This indicator reflects the probability that two randomly selected people from a given country will not share the same ethnicity, and it is expected to have a negative correlation with growth.

The results for cross-country data are shown in Table 39.[91] The structure is similar to the previous tables with odd columns corresponding to the baseline specification and even columns presenting the results after adding the interaction term.

Table 39. Cross-country OLS estimations with alternative controls, 1993-2012

	Dependent variable: real GDP per capita growth					
	20-year		10-year			
	1993-2012		1993-2002		2003-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
Initial pc GDP, log	-1.397***	-1.415***	-1.229***	-1.231***	-1.385***	-1.449***
	(0.283)	(0.277)	(0.305)	(0.302)	(0.276)	(0.259)
Education	0.0438**	0.0430*	0.0333*	0.0329*	0.0405	0.0401
	(0.0216)	(0.0218)	(0.0190)	(0.0193)	(0.0252)	(0.0249)
Terms of trade growth	0.00273	0.00284	-0.0915	-0.0907	0.00381	0.00431
	(0.00651)	(0.00645)	(0.0748)	(0.0754)	(0.00644)	(0.00628)
St. dev. terms of trade	0.00449	0.00480	0.0339	0.0351	0.0176	0.0153
	(0.00980)	(0.00972)	(0.0392)	(0.0355)	(0.0167)	(0.0158)
Geography	0.156	0.164	0.0387	0.0456	-0.270	-0.209
	(0.293)	(0.296)	(0.329)	(0.338)	(0.253)	(0.247)
Initial inflation	-0.599	-0.538	-0.348	-0.356	19.29***	20.72***
	(0.460)	(0.483)	(0.446)	(0.465)	(4.912)	(4.934)
Initial budget balance	0.0579	0.0555	0.0725	0.0703	0.0777	0.0880*
	(0.0480)	(0.0472)	(0.0525)	(0.0525)	(0.0491)	(0.0467)
Initial policy	0.249	0.175	0.992**	0.957*	0.165	-0.104
	(0.538)	(0.604)	(0.462)	(0.549)	(0.638)	(0.591)
Sub-Saharan Africa	-1.264**	-1.293**	-2.198***	-2.200***	-1.225*	-1.247**
	(0.586)	(0.582)	(0.725)	(0.730)	(0.644)	(0.618)
East Asia	1.403*	1.481**	0.952	0.979	1.022*	1.246**
	(0.723)	(0.664)	(0.820)	(0.861)	(0.562)	(0.529)
Latin America	0.345	0.322	-0.703	-0.708	-0.256	-0.258
	(0.548)	(0.549)	(0.638)	(0.648)	(0.552)	(0.538)
Initial M2/GDP	-0.00801	-0.00827	-0.0106	-0.0107	-0.00174	-0.00206
	(0.00510)	(0.00498)	(0.00792)	(0.00819)	(0.00593)	(0.00564)
Revolutions	-1.284**	-1.222*	-1.585*	-1.540*	-0.109	-0.0861
	(0.571)	(0.672)	(0.864)	(0.871)	(0.532)	(0.499)
Ethnic fractionalization	0.172	0.196	0.217	0.219	-0.109	0.00364
	(0.673)	(0.681)	(0.879)	(0.887)	(0.697)	(0.706)
State ineffectiveness	-0.335**	-0.363**	-0.429***	-0.438***	-0.369***	-0.438***
	(0.130)	(0.162)	(0.137)	(0.159)	(0.135)	(0.120)
Political violence	0.380**	0.373**	0.194	0.186	0.284*	0.304**
	(0.144)	(0.160)	(0.136)	(0.149)	(0.153)	(0.133)
SI x PV		-0.0211		-0.00790		-0.0605
		(0.0827)		(0.0876)		(0.0442)
Constant	13.99***	14.23***	12.15***	12.20***	12.58***	13.42***
	(2.506)	(2.471)	(2.525)	(2.477)	(2.411)	(2.299)
Observations	80	80	74	74	69	69
R^2	0.490	0.491	0.522	0.522	0.589	0.604
Adj. R^2	0.360	0.352	0.387	0.377	0.462	0.472

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

[91] The multicollinearity analysis was repeated for the new set of variables and no concerns were raised. More specifically, the correlation between political violence and revolutions was below 0.75 in all datasets.

Starting with the coefficients for the new explanatory variables, the obtained terms suggest a negative and significant effect of revolutions for the first two periods under consideration, but no significant effect for the decade 2003-2012. The initial level of financial depth exhibits a negative, small, coefficient across specifications, but it is not significant in any of them. Finally, the term for ethnic fractionalization indicates a positive effect of this variable on growth, but the coefficient is non-significant in all the regressions.

Focusing now on the coefficients for two indices of fragility, one observes that, similarly to the results in section 4.5.1, state ineffectiveness exhibits a negative and significant effect on economic growth in all specifications, even when controlling for the possibility of an interactive effect with political violence. Regarding the latter, its positive effect now holds in all periods considered, but remains significant only in periods 1993-2012 and 2003-2012. The lack of significance of the coefficients for the state ineffectiveness x political violence term again leads one to discard the hypothesis that there is an interactive effect of these variables on growth.

The same analysis was repeated using the panel data, and the coefficients obtained can be observed in Table 40. When this data structure is used, the level of financial depth shows a negative and significant effect for the dataset with 10-year averages, but it is very small in magnitude. Similarly to the cross-country results, the same effect is found for revolutions, which is significant in most specifications. Finally, again the results do not indicate a significant effect of ethnic fractionalization on growth.

In terms of the variables of interest, the main differences lie in the coefficient for political violence. In contrast with the results obtained before, this variable has a positive effect on growth, which is now significant and holds with different data structures and after the inclusion of the interaction term in the case of the 5-year averaged data. The results for state ineffectiveness and for its interaction with political violence remain roughly the same.

The second possibility I address in this sub-section is related to the fact that the dimensions captured by the state ineffectiveness index are similar to those usually included in measures of institutional quality. As discussed in the preliminary analysis to ascertain the potential for multicollinearity, the state ineffectiveness index is highly correlated with the ICRG indicator of quality of government, which is frequently used as an indicator of the quality of institutions in a country.

Table 40. Panel OLS estimations with alternative controls, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages		10-year averages	
	(1)	(2)	(3)	(4)
Initial pc GDP, log	-1.236***	-1.202***	-1.505***	-1.522***
	(0.342)	(0.339)	(0.233)	(0.224)
Education	0.0474**	0.0490**	0.0442**	0.0431**
	(0.0198)	(0.0198)	(0.0182)	(0.0183)
Terms of trade growth	0.00426	0.00390	-0.000873	-0.000433
	(0.0162)	(0.0163)	(0.00840)	(0.00817)
Geography	0.167	0.150	-0.104	-0.0758
	(0.259)	(0.270)	(0.236)	(0.241)
Inflation	0.901*	0.861**	0.0326	0.000128
	(0.467)	(0.425)	(0.546)	(0.578)
Budget balance	0.120**	0.117**	0.100**	0.0985**
	(0.0481)	(0.0490)	(0.0399)	(0.0384)
Trade policy	-0.314	-0.170	-0.0461	-0.213
	(0.706)	(0.689)	(0.501)	(0.503)
Sub-Saharan Africa	-1.975***	-1.914***	-2.122***	-2.130***
	(0.708)	(0.711)	(0.607)	(0.600)
East Asia	1.331*	1.218*	1.339*	1.455**
	(0.721)	(0.625)	(0.673)	(0.621)
Latin America	-0.212	-0.176	-0.320	-0.324
	(0.479)	(0.493)	(0.418)	(0.410)
M2/GDP	-0.00925	-0.00802	-0.0129**	-0.0136**
	(0.00796)	(0.00736)	(0.00576)	(0.00557)
Revolutions	-0.984**	-1.022**	-0.891*	-0.841
	(0.438)	(0.464)	(0.495)	(0.538)
Ethnic fractionalization	0.569	0.538	0.589	0.627
	(0.910)	(0.913)	(0.709)	(0.712)
State ineffectiveness	-0.302*	-0.260	-0.414***	-0.448***
	(0.154)	(0.163)	(0.115)	(0.120)
Political violence	0.255*	0.258*	0.208*	0.205
	(0.129)	(0.129)	(0.123)	(0.126)
SI x PV		0.0341		-0.0305
		(0.0678)		(0.0677)
Constant	14.60***	14.00***	16.11***	16.52***
	(3.347)	(3.216)	(2.277)	(2.121)
Observations	176	176	143	143
R^2	0.386	0.388	0.400	0.404
Adj. R^2	0.320	0.318	0.324	0.323

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Tables 41 and 42 include, first, the coefficients estimated for the main variables of interest when both the ICRG and the state ineffectiveness index are included in the analysis, and then the results obtained when the ICRG replaces the state ineffectiveness index.

When considering cross-country data (Table 41), with the exception of period 2003-2012, the coefficient for state ineffectiveness remains negative and significant, which suggests that the obtained results are robust even when controlling for the quality of institutions in the country. However, despite not being significant in any of the baseline regressions, the coefficient for the ICRG index shows a positive and significant effect when the state ineffectiveness index is dropped from the analysis.

Table 41. Cross-country OLS estimations with ICRG, 1993-2012

	Dependent variable: real GDP per capita growth					
	20-year		10-year			
	1993-2012		1993-2002		2003-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
ICRG	-0.0361	3.377**	2.068	4.010***	-0.964	2.160*
	(1.829)	(1.436)	(2.150)	(1.510)	(2.852)	(1.106)
State ineffectiveness	-0.363**		-0.377**		-0.392	
	(0.138)		(0.184)		(0.292)	
Political violence	0.198**	0.164*	-0.0201	-0.0618	0.281***	0.233**
	(0.0937)	(0.0924)	(0.0896)	(0.0977)	(0.0957)	(0.101)
Observations	85	87	80	83	75	76
R^2	0.516	0.505	0.529	0.604	0.682	0.661
Adj. R^2	0.420	0.417	0.427	0.529	0.608	0.590

Notes: The control variables included are: logarithm of the initial level of income per capita, the growth and variability of terms of trade, a measure of geography, initial level of inflation, initial budget balance, initial policy, and regional dummies for Sub-Saharan Africa, East Asia, and Latin America. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 42. Panel OLS estimations with ICRG, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages		10-year averages	
	(1)	(2)	(3)	(4)
ICRG	-0.224	1.935	0.610	2.276**
	(1.600)	(1.289)	(1.632)	(1.140)
State ineffectiveness	-0.313*		-0.307**	
	(0.161)		(0.142)	
Political violence	0.119	0.0322	0.124	0.113
	(0.109)	(0.115)	(0.0818)	(0.0866)
Observations	186	193	155	159
R^2	0.368	0.343	0.379	0.427
Adj. R^2	0.312	0.292	0.317	0.376

Notes: The control variables included are: logarithm of the initial level of income per capita, growth of terms of trade, a measure of geography, inflation, budget balance, policy, and regional dummies for Sub-Saharan Africa, East Asia, and Latin America. Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Looking now at the coefficients obtained for the two datasets with panel data (Table 42), again state ineffectiveness remains negative and significant, after the inclusion of ICRG. Similarly to the results with cross-country data, when state ineffectiveness is not included, the coefficient for the ICRG index is positive, though significant only with the dataset with 10-year averages.

A final robustness check was considered by replacing education with life expectancy as an indicator of human capital. The results are not reported here, but they showed a positive but non-significant effect of this variable in the three cross-sectional datasets as well as in the two datasets with panel data.

c) Single index of state fragility

A final test to the obtained results and to the overall claim in this thesis that it is important to consider the two indices separately is to compare the results with those obtained with a single index of state fragility. This is explored by using two different single indices of state fragility, derived from the data used in the construction of the state ineffectiveness and political violence indices: i) the first is the first principal component obtained from applying PCA to the two indices; ii) the second is the first principal component obtained from applying PCA to all of the dimensions used in the two indices. I will refer to the first as version 1 and to the second as version 2.[92]

These two variations of a single index of state fragility are then used to replace state ineffectiveness and political violence in the baseline growth regression. The results for cross-section data are reported in Table 43, whereas those obtained with the panel datasets are shown in Table 44. For brevity, I include only the coefficients obtained for the two indices.

Table 43. Cross-country OLS estimations with a single index of state fragility, 1993-2012

	Dependent variable: real GDP per capita growth					
	20-year		10-year			
	1993-2012		1993-2002		2003-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
State fragility (version 1)	-0.00254		-0.567***		0.0731	
	(0.193)		(0.205)		(0.215)	
State fragility (version 2)		-0.106		-0.353***		-0.0971
		(0.0857)		(0.0980)		(0.0983)
Observations	92	92	87	87	80	80
R^2	0.401	0.409	0.443	0.460	0.599	0.603
Adj. R^2	0.311	0.320	0.353	0.372	0.527	0.532

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The control variables included are: logarithm of the initial level of income per capita, the growth and variability of terms of trade, a measure of geography, initial level of inflation, initial budget balance, initial policy, and regional dummies for Sub-Saharan Africa, East Asia, and Latin America.

Table 44. Panel OLS estimations with a single index of state fragility, 1993-2012

	Dependent variable: real GDP per capita growth			
	5-year averages		10-year averages	
	(1)	(2)	(3)	(4)
State fragility (version 1)	-0.0335		-0.253	
	(0.219)		(0.183)	
State fragility (version 2)		-0.102		-0.203**
		(0.107)		(0.0835)
Observations	198	198	167	167
R^2	0.312	0.315	0.296	0.308
Adj. R^2	0.263	0.267	0.241	0.254

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The control variables included are: logarithm of the initial level of income per capita, growth of terms of trade, a measure of geography, inflation, budget balance, policy, regional dummies for Sub-Saharan Africa, East Asia, and Latin America, and time dummies.

The results concur with the argument that, by considering a single index of state fragility, one may be overlooking the effect of different aspects of this phenomenon. With the

[92] The eigenvectors obtained with these two procedures are included in Table C3.2 in Appendix C3.

exception of the 10-year period between 1993 and 2002, the coefficients for neither of the state fragility indices show a significant effect on economic growth. When considering panel data, only one of the obtained coefficients for each version of the index shows a significant impact of state fragility.

Before concluding this section, I add that the opposite reasoning was also considered. That is, the argument for the disintegration of state fragility proposed in this and in the previous chapters was taken to the extreme and all of the variables used in the construction of each of the indicators were used as regressors, instead of aggregated into indices. The obtained coefficients are not presented here but can be found in Appendix C4, Table C4.1. These preliminary results should be regarded with care, and one should not forget that the interpretation of some of them is now different. For example, most variables used to build the variable state ineffectiveness are negatively correlated with this index, and are thus expected to have a positive effect on growth. Bearing this in mind, I confine my comments on the obtained results to highlighting public expenditure in health, failure of state authority, and coups d'état as the only variables showing a significant effect in more than one specification.

d) Summary of results

The main insights from this section are synthesized in Table 45. In line with the results presented before, the negative and significant link between state ineffectiveness and growth is robust to excluding potentially influential observations, and to including additional covariates.

The results for the index of political violence are more surprising. When dropping outliers, in general the positive effect indicated by the obtained coefficient is not significant. However, the inclusion of the indicators of financial quality, revolutions, and ethnic fractionalization resulted in a positive and significant effect also in the panel regressions. Finally, there is again no evidence that supports the hypothesis of an interactive effect between the two variables.

In addition to these results, this section also demonstrated that by considering a single index of state fragility, one might not capture the effects of different dimensions of state fragility on growth. The coefficients obtained when considering two versions for a single index of state fragility (obtained from the same data used to build the state ineffectiveness and political violence indices) were significant in only a few of the

Table 45. Summary of results from the robustness checks

	Outliers	
	Cross-country	Panel
SI	Negative and significant effect in almost all specifications.	Negative and significant effect in all specifications.
PV	The sign of the coefficient varies depending on the period considered and it is significant in only one specification.	Positive effect, but it is not significant in any of the specifications.
SI x PV	The sign of the coefficient varies depending on the dataset used and it is never significant.	The sign of the coefficient varies depending on the dataset used and it is never significant.
	Alternative controls	
	Cross-country	Panel
SI	Negative and significant in all specifications.	Negative and significant in three of the four specifications.
PV	Positive coefficient in all specifications, but significant only when periods 1993-2012 and 2003-2012 are considered.	Positive and significant in three of the four specifications.
SI x PV	Negative coefficient, but small in magnitude and non-significant in all specifications.	The sign of the coefficient varies depending on the dataset used and it is never significant.

specifications considered. The next section takes into account the considerations about potential endogeneity made before, and explores a few possibilities to overcoming this challenge.

4.5.3. Addressing endogeneity

In light of the issues discussed in section 4.3.3, the following paragraphs present the results from exploring a series of strategies for overcoming the potential endogeneity of state ineffectiveness and political violence.

The first group of estimations follows one of the most common approaches and was obtained by applying instrumental variable procedures. More specifically, I explore three alternatives as instruments for state ineffectiveness: i) Acemoglu, Johnson and Robinson's (2001) logarithm of settler mortality; ii) Hall and Jones' (1999) list of instruments which represent the extent of Western European influence, namely distance to equator, fraction of the population speaking a European language, fraction of the population speaking English, and Frankel and Romer's log of predicted trade share; and iii) reduce the previous list to the distance to equator and the fraction of population speaking a European language. To clarify:

- Log of settler mortality: time-invariant variable representing the logarithm of the settler mortality estimates provided by Acemoglu, Johnson and Robinson (2001). According to these authors, the diseases that potential European settlers faced in the colonies (mostly malaria and yellow fever) influenced the patterns of settlement and the type of institutions that were put in place, but did not have a major effect on the health and economy of indigenous people;

- Distance to equator: time-invariant variable obtained by taking the absolute value of latitude in degrees and dividing it by 90 to obtain a 0-1 scale. Hall and Jones (1999) argue that at the start of the fifteenth century Western Europeans were more likely to move and settle in regions that were sparsely populated and with a similar climate to Western Europe, and these criteria suggest regions far from the equator;
- Population speaking a European language: time-invariant variable that represents the fraction of a country's population speaking one of the five primary Western European languages (English, French, German, Portuguese, and Spanish) as a mother tongue in the present (considering 1999 as the present year). According to the same authors, this will be correlated with the extent of Western European influence;
- Population speaking English: similarly to the previous variable, this is a time-invariant variable that captures the percentage of the population speaking English as a mother tongue, and was selected for similar reasons, but in order to allow for the potential of a separate impact;
- Frankel and Romer's log of predicted trade share: this variable was constructed by Frankel and Romer (1996) and is based on a gravity model of international trade that considers only the population of a country and its geographical characteristics.

In the case of political violence, two possibilities are examined with both cross-country and panel data: i) consider the initial value of political violence; and ii) use the level of domestic food price index (Food and Agriculture Organization, 2016) averaged across the relevant period as an instrument for this variable. The latter is inspired by the work that finds a positive causal link between rising food prices and social unrest (e.g. Arezki and Bruckner, 2011; Bellemare, 2014).

The subsequent paragraphs present and discuss the obtained results. The interaction term between state ineffectiveness and political violence poses additional challenges in terms of finding an appropriate instrument. In order to simplify the analysis, this term is not included in the discussion that follows.

a) State ineffectiveness

Table 46 contains the coefficients obtained by estimating the data with IV methods. Columns (1), (4), and (7) correspond to the results using the logarithm of settler mortality as an instrument for state ineffectiveness. Focusing on the main variables of interest, the coefficient for state ineffectiveness maintains its negative sign, but it is not significant in any of the datasets considered. Political violence shows a positive coefficient, which is significant only when the 20-year period is used.

The last rows of Table 46 contain the results for some of the tests for instrument strength. The p-value of the Lagrange-Multiplier (LM) statistic is obtained from an underidentification test using the rank-based statistic developed by Kleibergen and Paap (2006), which, if lower than 0.05, leads one to reject the hypothesis that the equation is underidentified. As pointed out by Bazzi and Clemens (2013: 158), even if the rejection of the null hypothesis is an indication that the smallest canonical correlation between endogenous variables and instruments is different from zero, this is not significant for strong correlation. Thus, I also include as an indicator of weak identification, the first-stage F-statistics, which, as a rule of thumb, should be at least 10 for weak identification not to be considered a problem (Staiger and Stock, 1997). The logarithm of settler mortality fails to pass both tests, thus indicating that it is not a strong instrument for the purposes of this analysis.

There are some reasons that may explain the weakness of the variable settler mortality rate as an instrument. First, the dependent variable used in this chapter is the GDP growth rate rather than the level of per capita income as in Acemoglu, Johnson and Robinson (2001) and subsequent studies. Second, the state ineffectiveness index is a more comprehensive measure when compared to the risk of expropriation, which is the measure of institutions used by the aforementioned authors. Furthermore, the results for the tests on instrument strength are very similar when the state ineffectiveness index is replaced by the ICRG index, another widely used measure of institutions.

Third, this instrument has been criticised by different authors (Albouy, 2012; Glaeser at al., 2004; Olsson, 2004). Albouy (2012) raises doubts about the reliability and comparability of the European setter mortality data. The author offers two main reasons for these concerns. First, Albouy (2012: 3060) claims that more than half of the mortality rates for the countries in the sample do not originate from within their own borders, but rather they are “unfounded and potentially contradictory” assignments based on countries with similar disease environments. Second, the author highlights that data on

Table 46. Cross-country IV estimations with instruments for state ineffectiveness, 1993-2012

	Dependent variable: real GDP per capita growth								
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Initial pc GDP, log	-1.238	-1.620***	-1.669***	-1.671**	-1.778***	-1.748***	-2.210**	-1.056**	-1.240***
	(1.281)	(0.431)	(0.426)	(0.764)	(0.599)	(0.570)	(0.983)	(0.426)	(0.383)
Education	0.0464	0.0282	0.0272	0.0269	0.0107	0.0112	0.0295	0.0548***	0.0533***
	(0.0346)	(0.0181)	(0.0184)	(0.0208)	(0.0177)	(0.0174)	(0.0432)	(0.0160)	(0.0160)
Terms of trade growth	0.00467	0.00362	0.00357	-0.207*	-0.141**	-0.140**	-0.00927**	0.000390	-0.000180
	(0.0227)	(0.00531)	(0.00544)	(0.122)	(0.0710)	(0.0700)	(0.00382)	(0.00690)	(0.00642)
St. dev. terms of trade	-0.000650	0.00737	0.00819	0.0614*	0.0301	0.0305	0.00567	0.00544	0.00808
	(0.0268)	(0.0103)	(0.0104)	(0.0347)	(0.0376)	(0.0377)	(0.0221)	(0.0144)	(0.0141)
Geography	0.238	0.153	0.140	-0.187	-0.130	-0.124	-0.626	-0.122	-0.194
	(0.536)	(0.280)	(0.280)	(0.455)	(0.310)	(0.304)	(0.629)	(0.280)	(0.258)
Initial inflation	0.238	-0.522	-0.507	0.0204	0.337	0.312	19.25***	16.38***	17.41***
	(0.229)	(0.448)	(0.452)	(0.413)	(0.479)	(0.464)	(6.712)	(5.194)	(4.844)
Initial budget balance	0.0893	0.0648	0.0642	0.0213	0.0567	0.0568	0.166*	0.0841**	0.0888***
	(0.0861)	(0.0404)	(0.0406)	(0.0934)	(0.0496)	(0.0491)	(0.0884)	(0.0337)	(0.0323)
Initial policy	0.393	0.177	0.155	1.025	0.572	0.595	-0.433	0.559	0.497
	(0.780)	(0.488)	(0.484)	(0.673)	(0.584)	(0.566)	(0.512)	(0.643)	(0.591)
Sub-Saharan Africa	-1.285*	-1.411***	-1.437***	-2.664***	-2.565***	-2.562***	-2.124**	-0.952*	-1.087**
	(0.704)	(0.491)	(0.491)	(0.730)	(0.697)	(0.694)	(0.827)	(0.577)	(0.535)
East Asia	1.319	1.110	1.107	0.766	0.511	0.505	0.502	1.220***	1.161***
	(0.922)	(0.676)	(0.680)	(0.806)	(0.739)	(0.739)	(0.692)	(0.377)	(0.363)
Latin America	-0.0229	0.348	0.373	-0.958	-0.953*	-0.967*	-0.426	-0.220	-0.227
	(0.988)	(0.445)	(0.447)	(0.777)	(0.576)	(0.564)	(0.555)	(0.565)	(0.532)
State ineffectiveness	-0.195	-0.451*	-0.488*	-0.810	-0.796**	-0.774**	-0.907	-0.000448	-0.135
	(0.931)	(0.272)	(0.268)	(0.574)	(0.395)	(0.371)	(0.903)	(0.264)	(0.242)
Political violence	0.297***	0.194*	0.199**	0.0245	-0.0358	-0.0385	0.365	0.178	0.204*
	(0.113)	(0.0998)	(0.100)	(0.135)	(0.103)	(0.101)	(0.239)	(0.119)	(0.109)
Constant	12.12	15.73***	16.16***	15.06**	16.96***	16.68***	20.73**	9.176**	10.76***
	(10.96)	(3.835)	(3.783)	(6.705)	(5.495)	(5.233)	(8.740)	(3.802)	(3.385)
Exogenous instruments	Settler mortality, log	Dist. equator; Euro. lg.; Eng. lg.; FR trade share	Dist. equator; European lang.	Settler mortality, log	Dist. equator; Euro. lg.; Eng. lg.; FR trade share	Dist. equator; European lang.	Settler mortality, log	Dist. equator; Euro. lg.; Eng. lg.; FR trade share	Dist. equator; European lang.
Observations	58	91	91	55	86	86	48	79	79
R^2	0.531	0.450	0.445	0.553	0.393	0.398	0.576	0.614	0.644
p-value[a]	---	0.754	0.807	---	0.946	0.785	---	0.254	0.501
p-value of LM statistic[b]	0.0906	0.000141	1.75e-05	0.0157	0.000506	0.000123	0.171	0.00341	0.000503
F-stat for weak ident.	2.401	8.632	15.22	5.340	8.296	11.88	1.669	7.235	11.50

Notes: *Settler mortality, log* is the logarithm of settler mortality rates provided by Acemoglu, Johnson and Robinson (2001). *Dist. equator* is obtained by taking the absolute value of latitude in degrees and dividing it by 90 to obtain a 0-1 scale. *Euro. lg.* and *Eng. lg.* correspond, respectively, to the fraction of a country's population speaking one of the five primary Western European languages (English, French, German, Portuguese, and Spanish) and English as a mother tongue. *FR trade share* is Frankel and Romer's log of predicted trade share. [a]p-value of Hansen J statistic. [b]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

mortality rates does not come from actual European settlers, but instead from European and American soldiers in the nineteenth century. After controlling for the source of the mortality rate, Albouy (2012: 3060) finds a substantially weaker correlation between expropriation risk and mortality rates. In a previous study, Glaeser et al. (2004) had already described some concerns about the validity of this variable as an instrument for institutions. The authors argued that the data is not informative about what European settlers brought, stating that it could have been human capital, political institutions, or something else. Therefore, the effects of colonial settlement could have worked through many channels, which undermines their validity as instruments for institutions (Glaeser et al., 2004: 296). Finally, Olsson (2004) had also demonstrated that disaggregating Acemoglu, Johnson and Robinson's (2001) sample into different groups for Latin American, African, Asian and Neo-European countries showed a weak or even non-existent link between disease environment and institutions.

Turning now to columns (2), (5), and (8), they correspond to the coefficients obtained when the four instruments proposed in Hall and Jones (1999) were employed. They indicate that the negative effect of state ineffectiveness on growth holds again in the three periods, and it is now significant in two of them (1993-2012 and 1993-2002). The term for political violence is positive and significant with period 1993-2012, but the sign changes and it is non-significant for the remaining periods, which suggests that the result is not robust across specifications. This instrumentation strategy is stronger than the one previously described. It passes the overidentification test, although the value for the F-test is still below the threshold level considered to rule out instrumentation weakness.

Based on the significance levels of the four variables used as instruments in the first-stage regressions (not presented here for space reasons), I dropped the fraction of the population speaking English and the measure of trade share, and kept only the distance to the equator and the fraction of the population speaking a European language as exogenous instruments.[93] The results are presented in columns (3), (6), and (9). They are similar to the ones obtained with the four instruments. State ineffectiveness holds a negative and significant coefficient for the 20-year period and for the decade 1993-2002, though there is a loss of significance for the period 2003-2012. The sign and significance level of the coefficient for political violence once again vary with the period considered, although it is positive and significant in two out of the three specifications. In terms of the strength of the instrument, considering only the distance to equator and the fraction

[93] This is partly in line with the instruments for institutions used in Alcala and Ciccone (2004).

of people speaking a European language has led to an improvement. This instrumentation strategy passes both tests of instrument weakness in all specifications, as shown in the last two rows of Table 46.

The same three sets of instruments were then applied to the panel data. The results are represented in Table 47, in columns (1)-(3) for 5-year averaged data, and (4)-(6) for 10-year averages.

Table 47. Panel IV estimations with instruments for state ineffectiveness, 1993-2012

	Dependent variable: real GDP per capita growth					
	5-year averages			10-year averages		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial pc GDP, log	-2.688**	-1.884***	-1.768***	-2.268**	-1.885***	-1.979***
	(1.241)	(0.640)	(0.608)	(0.927)	(0.522)	(0.491)
Education	0.0173	0.0343*	0.0358*	0.0343	0.0378***	0.0368**
	(0.0364)	(0.0196)	(0.0194)	(0.0298)	(0.0145)	(0.0147)
Terms of trade growth	-0.0398	-0.0176	-0.0158	-0.0154***	-0.00925	-0.00955
	(0.0300)	(0.0177)	(0.0181)	(0.00577)	(0.00783)	(0.00774)
Geography	-0.110	-0.0525	-0.0295	-0.344	-0.278	-0.306
	(0.413)	(0.287)	(0.274)	(0.422)	(0.265)	(0.261)
Inflation	1.145	1.402*	1.329*	0.901	0.878	1.004
	(0.756)	(0.790)	(0.749)	(0.802)	(0.782)	(0.767)
Budget balance	0.165**	0.117***	0.117***	0.159**	0.125***	0.128***
	(0.0700)	(0.0454)	(0.0445)	(0.0667)	(0.0361)	(0.0365)
Trade policy	-0.207	-0.504	-0.437	0.0290	0.0255	-0.0451
	(1.030)	(0.859)	(0.830)	(0.916)	(0.725)	(0.704)
Sub-Saharan Africa	-2.475***	-2.210***	-2.169***	-2.502***	-2.344***	-2.391***
	(0.751)	(0.581)	(0.557)	(0.683)	(0.611)	(0.612)
East Asia	1.403*	0.974	0.975	0.897	0.656	0.637
	(0.810)	(0.665)	(0.656)	(0.647)	(0.537)	(0.540)
Latin America	0.148	-0.328	-0.365	-0.238	-0.507	-0.482
	(0.665)	(0.471)	(0.448)	(0.640)	(0.400)	(0.394)
State ineffectiveness	-1.124	-0.631*	-0.557	-0.840	-0.525	-0.591**
	(0.804)	(0.380)	(0.364)	(0.687)	(0.323)	(0.301)
Political violence	0.249	0.0777	0.0713	0.212	0.0707	0.0810
	(0.155)	(0.102)	(0.102)	(0.203)	(0.106)	(0.103)
Constant	27.29**	20.04***	18.96***	22.31**	18.66***	19.55***
	(11.91)	(6.219)	(5.885)	(8.991)	(5.106)	(4.791)
Exogenous instruments	Settler mortality, log	Dist. equator; Euro. lg.; Eng. lg.; FR trade share	Dist. equator European lang.	Settler mortality, log	Dist. equator; Euro. lg.; Eng. lg.; FR trade share	Dist. equator European lang.
Observations	136	196	196	103	165	165
R^2	0.361	0.295	0.304	0.428	0.320	0.311
Adj. R^2	0.287	0.240	0.250	0.344	0.262	0.252
p-value[a]	---	0.753	0.606	---	0.774	0.927
p-value of LM statistic[b]	0.0339	0.000447	7.72e-05	0.0185	0.000335	6.61e-05
F-stat for weak ident.	4.465	9.348	12.97	5.412	10.38	13.77

Notes: *Settler mortality, log* is the logarithm of settler mortality rates provided by Acemoglu, Johnson and Robinson (2001). *Dist. equator* is obtained by taking the absolute value of latitude in degrees and dividing it by 90 to obtain a 0-1 scale. *Euro. lg.* and *Eng. lg.* correspond, respectively, to the fraction of a country's population speaking one of the five primary Western European languages (English, French, German, Portuguese, and Spanish) and English as a mother tongue. *FR trade share* is Frankel and Romer's log of predicted trade share. All estimations include time dummies. Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]p-value of Hansen J statistic. [b]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

In all three cases, these instrumentation strategies seem stronger when applied to this data structure. In terms of the obtained results, they are roughly in line with those obtained before. The sign of the coefficient for state ineffectiveness is negative in all estimations, but significant in only some of the specifications considered. The political violence term is now positive in all specifications, but not significant in any one of them.[94]

b) Political violence

Finding an appropriate instrument for political violence is even harder than the quest for instruments for state ineffectiveness. A great number of studies exploring the links between variables related to political violence use GMM methods (e.g. Bodea and Elbadawi, 2008; Biswas et al., 2016). However, given the limitations of these methods[95], I opt for exploring two different approaches here.

The first strategy used to isolate the possible effect of economic growth on the level of political violence was to consider its initial value in the regressions. The results obtained for cross-country and for panel data are presented in Table 48. Overall, they do not show significant differences in terms of the signs and significance levels for the two variables of interest. In fact, one still observes a positive coefficient for political violence in most cases, which, however, is only significant in two out of the five specifications. The negative and significant effect of state ineffectiveness remains robust in all regressions.

The second attempt considered a food price index as an instrument for political violence. As discussed in section 4.4.3, a few recent studies have determined a link between rising food prices and increases in the levels of political violence (Arezki and Bruckner, 2011; Bellemare, 2014). The results obtained for cross-country and panel data, portrayed in Table 49, cast serious doubts on the strength of this variable as an instrument. There was a dramatic loss in the explanatory power of the model and the tests for instrument weakness are failed across specifications.[96]

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[94] In an additional attempt to overcome the problem that weak instruments may lead to estimated coefficients that are biased towards OLS, I use Limited Information Maximum Likelihood (LIML) estimation. Following Ricciuti, Savoia and Sen (2016: 25), I use the Fuller's version of LIML (Fuller, 1977; Baum, Schaffer and Stillman, 2007), which is more robust than the IV methods in the presence of weak instruments and seems to have lower small-sample variability when compare to LIML. In line with the strategy by the same authors, I employ the Fuller 4 version, which minimises the mean squared error of the estimator (Fuller, 1977). In the just identified case, the IV and the LIML estimators are the same. Thus, this strategy was only employed when Hall and Jones' (1999) instruments were used, and when these were restricted. The results are in line with the IV estimations and can be found in Table C4.2, in Appendix C4.

[95] See, for instance, Roodman (2009), Arndt, Jones and Tarp (2010), and Frot and Perrotta (2012).

[96] Terrain ruggedness was also considered as a potential instrument for political violence. Despite passing the tests for instrumental weakness, the argument for the exogeneity of this variable was hard to defend. For instance, the impact of terrain ruggedness on income through its effects on institutions has been defended in the literature (e.g. Nunn and Puga, 2012).

Table 48. Cross-country and panel OLS estimations with initial level of political violence, 1993-2012

	Dependent variable: real GDP per capita growth				
	Cross-country			Panel	
	20-year	10-year		5-year	10-year
	1993-2012	1993-2002	2003-2012	averages	averages
	(1)	(2)	(3)	(4)	(5)
Initial pc GDP, log	-1.410***	-1.221***	-1.484***	-1.226***	-1.572***
	(0.258)	(0.285)	(0.226)	(0.327)	(0.235)
Education	0.0314*	0.0185	0.0451**	0.0407**	0.0375***
	(0.0187)	(0.0151)	(0.0182)	(0.0176)	(0.0143)
Terms of trade growth	0.00530	-0.112*	0.00331	0.00317	-0.00233
	(0.00536)	(0.0660)	(0.00585)	(0.0162)	(0.00828)
St. dev. terms of trade	0.00387	0.0399	0.0171		
	(0.00990)	(0.0399)	(0.0145)		
Geography	0.231	-0.0326	-0.236	0.127	-0.146
	(0.260)	(0.288)	(0.236)	(0.240)	(0.219)
Inflation[a]	-0.557	-0.287	19.93***	1.138**	0.189
	(0.467)	(0.448)	(4.108)	(0.522)	(0.528)
Budget balance[a]	0.0674	0.0551	0.0967**	0.130***	0.124***
	(0.0421)	(0.0464)	(0.0368)	(0.0462)	(0.0366)
Policy[a]	0.236	1.080**	0.155	-0.407	0.0648
	(0.514)	(0.465)	(0.563)	(0.734)	(0.538)
Sub-Saharan Africa	-1.279***	-2.558***	-1.187**	-1.929***	-2.158***
	(0.477)	(0.685)	(0.542)	(0.538)	(0.569)
East Asia	1.127	0.404	1.063**	0.912	0.686
	(0.724)	(0.806)	(0.426)	(0.651)	(0.575)
Latin America	0.272	-1.227**	-0.125	-0.457	-0.501
	(0.440)	(0.558)	(0.534)	(0.406)	(0.402)
State ineffectiveness	-0.303***	-0.382***	-0.375***	-0.238*	-0.322***
	(0.110)	(0.144)	(0.118)	(0.126)	(0.0990)
Initial political violence	0.183*	-0.0999	0.280***	0.0754	0.0545
	(0.0980)	(0.113)	(0.0907)	(0.106)	(0.0977)
Constant	13.88***	11.83***	13.08***	13.05***	16.04***
	(2.387)	(2.598)	(2.050)	(3.102)	(2.384)
Observations	92	87	80	198	167
R^2	0.456	0.456	0.663	0.325	0.322
Adj. R^2	0.365	0.359	0.597	0.273	0.264

Notes: Robust and cluster robust standard errors in parentheses for cross-country and panel estimates, respectively. *** p<0.01, ** p<0.05, * p<0.1. Panel estimations include time dummies. [a]The initial level of these three variables is considered in the cross-country regressions.

Table 49. Cross-country and panel IV estimations with instrument for political violence, 1993-2012

	Dependent variable: real GDP per capita growth				
	Cross-country			Panel	
	20-year	10-year		5-year	10-year
	1993-2012	1993-2002	2003-2012	averages	averages
	(1)	(2)	(3)	(4)	(5)
Initial pc GDP, log	-0.924*	-0.578	-1.313***	-0.574	-1.121**
	(0.552)	(0.748)	(0.342)	(0.731)	(0.513)
Education	0.0267	0.0202	0.0421**	0.0354	0.0339**
	(0.0205)	(0.0238)	(0.0183)	(0.0222)	(0.0164)
Terms of trade growth	0.00328	-0.0636	-0.00148	2.46e-05	-0.0126
	(0.00715)	(0.0923)	(0.00419)	(0.0182)	(0.0105)
St. dev. TOT growth	-0.0128	-0.00740	0.00588		
	(0.0190)	(0.0567)	(0.0120)		
Geography	0.634	0.858	-0.00667	0.526	0.460
	(0.521)	(0.772)	(0.317)	(0.492)	(0.524)
Inflation[a]	0.205	-0.935	18.50***	1.455	-0.674
	(0.603)	(0.870)	(3.983)	(4.571)	(1.054)
Budget balance[a]	0.153**	0.199	0.112***	0.165**	0.187***
	(0.0631)	(0.121)	(0.0418)	(0.0799)	(0.0678)
Policy[a]	0.648	2.543**	-0.0560	0.228	1.742
	(0.705)	(1.108)	(0.746)	(1.384)	(1.368)
Sub-Saharan Africa	1.143	0.518	-0.270	-0.0366	-0.0837
	(2.003)	(2.405)	(1.415)	(1.923)	(1.929)
East Asia	1.092	0.556	1.184***	0.361	0.966
	(0.687)	(1.015)	(0.377)	(0.769)	(0.600)
Latin America	1.976	1.693	0.552	1.223	1.315
	(1.714)	(2.214)	(1.112)	(1.759)	(1.661)
State ineffectiveness	-0.617**	-0.754**	-0.428**	-0.418	-0.549*
	(0.297)	(0.377)	(0.196)	(0.326)	(0.281)
Political violence	1.325	1.490	0.618	1.047	1.071
	(0.863)	(1.079)	(0.568)	(0.870)	(0.863)
Constant	8.707	4.106	11.72***	7.082	9.792
	(5.432)	(7.689)	(3.768)	(8.185)	(6.192)
Exogenous instrument		Food prices		Food prices	
Observations	88	83	78	147	161
R^2	-0.311	-0.728	0.660	-0.076	-0.100
Adj. R^2	-0.541	-1.054	0.591	-0.181	-0.198
p-value of LM statistic[b]	0.106	0.101	0.186	0.113	0.152
F-stat for weak ident.	2.635	2.374	1.568	2.539	1.944

Notes: Results obtained considering the *domestic food price index* as an instrument for political violence. Robust and cluster robust standard errors in parentheses for cross-country and panel estimates, respectively. *** p<0.01, ** p<0.05, * p<0.1. Panel estimations include time dummies. [a]The initial level of these three variables is considered in the cross-country regressions. [b]The null hypothesis of the Kleibergen-Paap Lagrange Multiplier test is that the structural equation is underidentified.

Finally, I consider two alternative approaches. Firstly, I use as controls the lagged values of the time-variant explanatory variables included before, alongside the initial level of per capita GDP, the measure of geography and the three regional dummies. Despite the problems of this approach, it has the advantage of addressing the potential of endogeneity of both variables simultaneously. The results are presented in Table 50. The estimates for the two variables of interest show a loss in the significance level for the coefficient of state ineffectiveness when 10-year averaged data are used, whereas the

Table 50. Panel OLS estimations with lagged values of the explanatory variables, 1993-2012

	Dependent variable: real GDP per capita growth	
	5-year averages	10-year averages
	(1)	(2)
Log of initial pc GDP	-1.110***	-1.296***
	(0.356)	(0.330)
Education, lagged	0.0449**	0.0429**
	(0.0183)	(0.0207)
Terms of trade, lagged	0.00891	-0.0268
	(0.0174)	(0.0744)
Geography	0.174	0.319
	(0.228)	(0.302)
Inflation, lagged	0.854	1.697*
	(0.802)	(0.993)
Budget balance, lagged	0.0784*	0.103*
	(0.0410)	(0.0605)
Trade policy, lagged	-0.504	-0.0848
	(0.713)	(0.912)
Sub-Saharan Africa	-0.707	0.0861
	(0.626)	(0.707)
East Asia	1.557**	1.772**
	(0.664)	(0.755)
Latin America	0.444	1.440**
	(0.451)	(0.667)
State ineffectiveness, lagged	-0.0443	-0.276*
	(0.126)	(0.149)
Political violence, lagged	0.239**	0.488***
	(0.115)	(0.143)
Constant	10.18***	12.60***
	(3.381)	(3.466)
Observations	198	87
R^2	0.392	0.521
Adj. R^2	0.346	0.444

Notes: Cluster robust standard errors in parentheses. All estimations include time dummies. *** p<0.01, ** p<0.05, * p<0.1.

term for political violence remains positive and it is now significant in both specifications.

The second is inspired by Bertocchi and Guerzoni's (2010) approach. These authors suggest that by employing as instruments the lagged values of the regressors, they are able to guarantee that their values are determined before those of the dependent variable (Bertocchi and Guerzoni, 2010: 12-13). In their work, they apply this instrumentation strategy to all of the regressors given that they are all potentially endogenous. Here I assume that only the two indices of fragility are endogenous, but consider as exogenous instruments the lagged values of the time-variant explanatory variables, namely, education, terms of trade growth, inflation, budget balance, trade policy, state ineffectiveness and political violence. The results are presented in Table 51 and suggest that there are no major changes when the 10-year averaged dataset is used. The results in Column (1) show that none of the coefficients for the variables of interest is significant. Still, it is important to notice the significant loss of countries in the sample,

Table 51. Panel IV estimations with lagged values as instruments, 1993-2012

	Dependent variable: real GDP per capita growth	
	5-year averages	10-year averages
	(1)	(2)
Log of initial pc GDP	-1.192***	-1.336***
	(0.418)	(0.264)
Education	0.0440**	0.0491***
	(0.0192)	(0.0174)
Terms of trade	0.0144	0.0111**
	(0.0111)	(0.00483)
Geography	0.0753	-0.219
	(0.270)	(0.225)
Inflation	4.162	14.90***
	(3.846)	(5.096)
Budget balance	0.0752*	0.100***
	(0.0440)	(0.0247)
Trade policy	-1.770**	-0.802
	(0.857)	(0.521)
Sub-Saharan Africa	-1.834**	-0.655
	(0.776)	(0.517)
East Asia	0.685	1.298***
	(0.586)	(0.408)
Latin America	-0.416	0.541
	(0.487)	(0.519)
State ineffectiveness	-0.0524	-0.325**
	(0.172)	(0.136)
Political violence	0.0355	0.373***
	(0.133)	(0.109)
Constant	15.04***	13.02***
	(4.191)	(2.581)
Exogenous instruments	Lagged values of education, terms of trade growth, inflation, budget balance, trade policy, state ineffectiveness and political violence	
Observations	112	75
R^2	0.479	0.651
Adj. R^2	0.409	0.584
p-value of LM statistic[b]	0.0192	0.0296
F-stat for weak ident.	19.44	12.35

Notes: Cluster robust standard errors in parentheses. All estimations include time dummies. *** p<0.01, ** p<0.05, * p<0.1.

and to bear in mind the limitations in terms of the number of periods for which data are available.

c) Summary of results

An overview of the conclusions from this section is provided in Table 52. Overall, the results concur with those obtained before.

Although it loses its significance in some specifications when different periods are considered, the coefficient for state ineffectiveness maintains its negative sign and concurs to the conclusions drawn before of an effect of this variable on growth. The positive sign of political violence is more pervasive when the endogeneity of this variable

Table 52. Summary of results after taking endogeneity into account

	Cross-country	Panel
	Endogeneity of state ineffectiveness	
SI	Negative effect in all specifications, but significant in only some of them.	Negative coefficient in all specifications, but significant in only some of them.
PV	The sign of the coefficient and its significance level vary depending on the period considered.	Positive sign in all coefficients, but they are never significant.
	Endogeneity of political violence	
	Cross-country	Panel
SI	Negative and significant in all specifications.	Negative coefficient for both data structures and significant in most of them.
PV	Positive coefficient in all specifications but one, and generally non-significant.	Positive sign, but the term is only significant in some specifications.

is taken into account. However, the lack of significance of this term in most specifications suggests no link between this variable and growth.

4.5.4. Spline regressions

Before discussing the results obtained throughout this chapter, the final part of this section explores an additional possibility for modelling state ineffectiveness and political violence. More specifically, I investigate whether each of these variables has a non-linear relationship with growth, and allow for the effect of each of the state fragility indices to have a different effect depending on the level of these variables. In order to do this, I make use of linear splines.

The idea behind linear splines is that the relationship between the dependent and the independent variables can be estimated as a piecewise linear function, which is composed of linear segments (StataCorp., 2013). Each segment represents the function for an interval of the values of the independent variable, and they are arranged so that they join at specific points called knots. The choice of the location and the number of knots is, however, difficult and, unless obvious from the data structure, needs to be determined by the user.

In order to avoid making an *ad hoc* choice, I present the results obtained considering one single knot in different values of the variable of interest. The results are summarised in Tables 53 and 54 considering a spline function for state ineffectiveness and political violence, respectively.

Table 53. Spline regressions for state ineffectiveness considering different knots, 1993-2012

	Dependent variable: real GDP per capita growth									
	Knots									
	-5	-4	-3	-2	-1	0	1	2	3	4
	Cross-country									
	1993-2012 *(92 observations)*									
State ineffectiveness 1		0.601	0.236	0.135	0.0146	-0.0936	-0.190	-0.273**	-0.306**	-0.277**
		(0.561)	(0.283)	(0.190)	(0.153)	(0.132)	(0.124)	(0.121)	(0.122)	(0.119)
State ineffectiveness 2		-1.005	-0.708**	-0.735***	-0.731***	-0.721***	-0.731***	-0.744*	-0.573	16.92**
		(0.610)	(0.337)	(0.253)	(0.232)	(0.226)	(0.270)	(0.408)	(0.896)	(7.842)
R^2		*0.474*	*0.485*	*0.509*	*0.518*	*0.519*	*0.503*	*0.478*	*0.459*	*0.487*
	1993-2002 *(87 observations)*									
State ineffectiveness 1	7.457	0.557	-0.00511	-0.0678	-0.208	-0.261	-0.306*	-0.361**	-0.383**	
	(16.17)	(0.771)	(0.375)	(0.267)	(0.219)	(0.192)	(0.169)	(0.161)	(0.160)	
State ineffectiveness 2	-7.847	-1.025	-0.477	-0.483	-0.353	-0.348	-0.460	-0.491	0.0470	
	(16.19)	(0.824)	(0.429)	(0.331)	(0.306)	(0.310)	(0.370)	(0.577)	(1.493)	
R^2	*0.457*	*0.467*	*0.465*	*0.471*	*0.465*	*0.465*	*0.467*	*0.461*	*0.456*	
	2003-2012 *(80 observations)*									
State ineffectiveness 1	2.180	0.697	0.206	0.0250	-0.109	-0.197	-0.274**	-0.368***	-0.375***	-0.356***
	(2.455)	(0.536)	(0.279)	(0.191)	(0.156)	(0.140)	(0.133)	(0.126)	(0.125)	(0.124)
State ineffectiveness 2	-2.582	-1.211**	-0.778**	-0.682***	-0.616**	-0.578**	-0.548*	-0.146	-0.0980	5.749
	(2.478)	(0.590)	(0.338)	(0.257)	(0.237)	(0.237)	(0.292)	(0.444)	(0.902)	(4.838)
R^2	*0.669*	*0.684*	*0.689*	*0.696*	*0.695*	*0.692*	*0.681*	*0.664*	*0.663*	*0.670*
	Panel									
	5-year averages *(198 observations)*									
State ineffectiveness 1	4.002	1.392**	0.644*	0.334	0.0982	-0.0574	-0.114	-0.170	-0.167	-0.180
	(4.451)	(0.671)	(0.331)	(0.226)	(0.182)	(0.161)	(0.145)	(0.136)	(0.134)	(0.129)
State ineffectiveness 2	-4.183	-1.704**	-1.024***	-0.773***	-0.541**	-0.311	-0.286	0.108	1.780	26.28***
	(4.466)	(0.720)	(0.384)	(0.283)	(0.256)	(0.258)	(0.311)	(0.485)	(1.111)	(6.363)
R^2	*0.250*	*0.269*	*0.275*	*0.276*	*0.265*	*0.253*	*0.250*	*0.247*	*0.257*	*0.311*
	10-year averages *(167 observations)*									
State ineffectiveness 1	4.412	0.820	0.243	0.0993	-0.0560	-0.146	-0.210*	-0.275**	-0.277**	-0.276**
	(3.145)	(0.539)	(0.275)	(0.193)	(0.158)	(0.138)	(0.125)	(0.116)	(0.114)	(0.110)
State ineffectiveness 2	-4.718	-1.215**	-0.673**	-0.605**	-0.476**	-0.403*	-0.391	-0.114	1.199	19.41***
	(3.160)	(0.582)	(0.323)	(0.250)	(0.233)	(0.235)	(0.281)	(0.429)	(0.896)	(5.251)
R^2	*0.315*	*0.324*	*0.324*	*0.330*	*0.323*	*0.318*	*0.314*	*0.305*	*0.313*	*0.362*

Notes: Assuming *k* as the value of the knot, State ineffectiveness 1 assumes the values of state ineffectiveness for the values of this variable lower than *k*, and the value of the knot for values of this variable higher than or equal to *k*. State ineffectiveness 2 assumes the value of 0 for the values of state ineffectiveness lower than *k*, and the value of state ineffectiveness minus *k* for values of this variable higher than or equal to *k*. The analysis includes the same covariates as before. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 54. Spline regressions for political violence considering different knots, 1993-2012

	Dependent variable: real GDP per capita growth									
	Knots									
	-2	-1	0	1	2	3	4	5	6	7
	Cross-country									
	1993-2012 *(91 observations)*									
Political violence 1	12.10	0.669	0.134	0.0724	0.122	0.111	0.129	0.155	0.155	0.155
	(16.68)	(0.698)	(0.370)	(0.251)	(0.183)	(0.141)	(0.129)	(0.126)	(0.126)	(0.126)
Political violence 2	-11.92	-0.511	0.0609	0.179	0.145	0.292	0.359	0.276	0.455	1.282
	(16.69)	(0.724)	(0.433)	(0.365)	(0.348)	(0.361)	(0.445)	(0.617)	(1.015)	(2.860)
R^2	*0.459*	*0.459*	*0.456*	*0.457*	*0.457*	*0.460*	*0.460*	*0.457*	*0.457*	*0.457*
	1993-2002 *(87 observations)*									
Political violence 1	4.677	-0.445	-0.337	-0.135	-0.157	-0.197	-0.181	-0.180	-0.180	-0.180
	(9.688)	(0.762)	(0.438)	(0.277)	(0.202)	(0.157)	(0.140)	(0.138)	(0.138)	(0.138)
Political violence 2	-4.781	0.366	0.296	0.0586	0.141	0.420	0.608	0.878	1.407	3.544
	(9.694)	(0.797)	(0.525)	(0.414)	(0.395)	(0.419)	(0.503)	(0.680)	(1.089)	(2.744)
R^2	*0.457*	*0.457*	*0.458*	*0.456*	*0.457*	*0.463*	*0.466*	*0.468*	*0.468*	*0.468*
	2003-2012 *(80 observations)*									
Political violence 1	45.56	1.197	0.622	0.252	0.220	0.244	0.226*	0.242*	0.242*	0.242*
	(42.18)	(0.786)	(0.394)	(0.287)	(0.198)	(0.157)	(0.130)	(0.123)	(0.123)	(0.123)
Political violence 2	-45.28	-0.942	-0.403	0.0421	0.133	0.135	0.390	0.443	0.753	2.505
	(42.18)	(0.800)	(0.446)	(0.398)	(0.368)	(0.415)	(0.504)	(0.661)	(1.123)	(3.734)
R^2	*0.669*	*0.670*	*0.668*	*0.663*	*0.664*	*0.664*	*0.666*	*0.666*	*0.666*	*0.666*
	Panel									
	5-year averages *(198 observations)*									
Political violence 1	7.774	-0.0706	-0.487	-0.269	-0.0564	-0.00386	0.0264	0.0689	0.0693	0.0700
	(10.84)	(0.704)	(0.380)	(0.266)	(0.183)	(0.139)	(0.120)	(0.118)	(0.117)	(0.117)
Political violence 2	-7.673	0.182	0.714	0.588	0.373	0.423	0.546	0.360	0.570	1.400
	(10.84)	(0.728)	(0.443)	(0.386)	(0.351)	(0.362)	(0.423)	(0.562)	(0.896)	(2.240)
R^2	*0.249*	*0.247*	*0.257*	*0.256*	*0.251*	*0.252*	*0.254*	*0.249*	*0.248*	*0.248*
	10-year averages *(167 observations)*									
Political violence 1	-8.539	-0.121	0.0147	-0.0447	-0.0272	-0.0220	-0.00180	0.0297	0.0316	0.0410
	(9.658)	(0.632)	(0.344)	(0.232)	(0.167)	(0.131)	(0.114)	(0.111)	(0.111)	(0.110)
Political violence 2	8.607	0.196	0.0629	0.179	0.224	0.362	0.525	0.447	0.698	1.441
	(9.660)	(0.652)	(0.401)	(0.337)	(0.318)	(0.346)	(0.420)	(0.561)	(0.923)	(2.552)
R^2	*0.308*	*0.305*	*0.305*	*0.306*	*0.307*	*0.310*	*0.312*	*0.308*	*0.307*	*0.306*

Notes: Assuming *k* as the value of the knot, Political violence 1 assumes the values of political violence for the values of this variable lower than *k*, and the value of the knot for values of this variable higher than or equal to *k*. Political violence 2 assumes the value of 0 for the values of political violence lower than *k*, and the value of political violence minus *k* for values of this variable higher than or equal to *k*. The analysis includes the same covariates as before. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The obtained coefficients measure the change in slope from the preceding group[97], which allows for the possibility to test whether the change in slope is significant. Thus, the interpretation of the coefficient will be:

$$\frac{dy}{d\mathrm{si}} = \begin{cases} a_1, & si < knot \\ a_1 + a_2, & si \geq knot \end{cases}$$

$$\frac{dy}{d\mathrm{pv}} = \begin{cases} a_1, & pv < knot \\ a_1 + a_2, & pv \geq knot \end{cases}$$

Assuming k as the value of the knot, for values of state ineffectiveness lower than k, *State ineffectiveness 1* equals the value of state ineffectiveness, whereas *State ineffectiveness 2* is equal to 0. For values of state ineffectiveness higher than or equal to k, *State ineffectiveness 1* is equal to k, whereas *State ineffectiveness 2* equals the value of state ineffectiveness minus k.

To give an example, let us look at the results for state ineffectiveness for period 1993-2012, and to the fourth column, which corresponds to the results obtained after specifying the knot at the value -2 for state ineffectiveness. The coefficients indicate that for values of state ineffectiveness lower than -2, the effect of an additional one unit in the level of state ineffectiveness on growth would be 0.135, but it is non-significant; and for values of state ineffectiveness higher than or equal to -2, it would be -0.6 (the result from summing -0.735 to 0.135). This coefficient is now significant, which indicates that there is evidence that the effect of state ineffectiveness changes after the break point.

Starting with the results for state ineffectiveness, the first impression from Table 53 is that the results obtained depend on the data structure and the period considered, as well as on the location of knots. Still, the results are generally supportive of the negative effect of state ineffectiveness. Roughly speaking, looking at the coefficients obtained when knots are at points -1 and 0 for cross-country data for periods 1993-2012 and 2003-2012 (which correspond to the specifications with higher values of R^2), the results indicate the effect of state ineffectiveness changes after the breaking point. More specifically, the coefficients suggest that a movement in the position of the country from moderately effective to very ineffective (e.g. from 0 to 3) would have a negative and significant impact on growth (in line with the results in section 4.5.1). In other words, moving from very ineffective to moderately effective would raise growth. However, an

[97] They were derived from applying command *mkspline* from Stata and using the option *marginal*.

improvement in the position of the country from moderately effective to very effective (e.g. from -2 to -4) does not seem to affect growth.

Generally speaking, this also seems to be the case when using 10-year averaged panel data. However, the conclusions are harder to draw for the cross-country dataset for period 1993-2002 and for panel data obtained with 5-year averages.

The results for political violence (Table 54) also concur with the conclusions derived in the previous sections. With rare exceptions, they show no significant effect of this variable on growth in any of the specifications considered, which allow not only for different data structures and time periods (similarly to what was done before), but also for different effects considering diverse breaking points.

4.6. DISCUSSION OF THE RESULTS

This section draws together the insights from the results obtained from the empirical analysis, and positions them in relation to the main conclusions found in previous literature. I start by recapitulating the main conclusions in Table 55, organised in order to highlight the variation of the results obtained for each of the variables of interest.

The summary of the estimated coefficient for state ineffectiveness seems unanimous in terms of the sign of the effect, which is significant in most cases. The results based on OLS estimates should be regarded with care as they may be biased (given the problems of endogeneity discussed before and the fact that I cannot correct for unobserved country effects). Additionally, the IV estimates were obtained with instruments that did not pass all the tests for instrument strength. Despite acknowledging these limitations, as shown in Table 55, the negative sign and the significance level of the coefficient seem to be robust to using different specifications and estimation methods, thus suggesting that there is support to the hypothesis that countries with higher levels of state ineffectiveness are expected to grow at lower rates.

This is in line with the theory described in section 4.2, which suggests that in general there is a positive link between state capacity and economic growth, and more specifically that the quality of institutions is an important determinant. The indicator for state ineffectiveness comprises different dimensions of the capacity as well as the effectiveness of the state, thus lending support to the view that attributes an important role to the state in the promotion of development.

Table 55. Review of the empirical results

	SI	PV	SI x PV
		Cross-country data	
Baseline OLS estimates	The coefficient is **negative and significant** in all specifications.	**Positive** and **significant** for two of the periods, but the sign **varies** and it **loses significance** for period 1993-2002.	**Negative** coefficient, but it is **not significant** in any specification.
Outliers excluded	**Negative and significant** effect in almost all specifications.	The sign of the coefficient **varies** depending on the period considered and it is **rarely significant**.	The sign of the coefficient **varies** depending on the dataset used and it is **never significant**.
Alternative controls	**Negative and significant** effect in all specifications.	**Positive** coefficient in all specifications, but it **loses significance** for period 1993-2002.	**Negative** coefficient, but small in magnitude and **non-significant** in all specifications.
Addressing endogeneity	**Negative** and **significant in most** specifications.	Positive sign in most specifications, but the **sign** of the coefficient and its **significance** level **vary** depending on the period considered.	----
		Panel data	
Baseline OLS estimates	**Negative and significant** in all specifications, but one of them.	The coefficient is **positive**, but small in magnitude and **never significant**.	The sign of the coefficient **changes** depending on the specification considered, but it is **not significant** in neither of them.
Outliers excluded	**Negative and significant** effect in all specifications.	**Positive** effect, but it is **not significant** in any of the specifications.	The sign of the coefficient **varies** depending on the dataset used and it is **never significant**.
Alternative controls	**Negative and significant in most** specifications.	**Positive** and **significant in most** specifications.	The sign of the coefficient **varies** depending on the dataset used and it is **never significant**.
Addressing endogeneity	**Negative** and **significant in some** specifications.	**Positive** sign in all specifications, but the coefficient is **rarely significant.**	----

The conclusion for the effect of political violence is less clear. When cross-country data are used, the sign and significance level of the coefficient seem to vary depending on the period and method applied. With panel data, the positive sign seems more pervasive across specifications, but it is rarely significant. I, therefore, conclude that the model used in this chapter fails to find a definite conclusion about the impact of political violence on growth, though the estimated coefficients seem to indicate that there is no causal effect.

At face value, the latter result seems to be at odds with the intuition. Also, the main conclusion from many of the studies examining the link between different dimensions of political violence and economic growth reviewed in section 4.2 suggests a negative causal effect. Bearing this in mind, I advance some possible reasons that may explain the obtained results. However, I acknowledge that these are based on speculation.

The first set of possibilities is related to some methodological challenges in the analysis. First, despite the attempts made in section 4.5.3 to take the potential for endogeneity into account, the challenge of isolating the causal effect of political violence on growth from the reverse effect remains hard to overcome. Second, the measure of political violence used here does not allow for a distinction between conflicts with different nature, thus disguising potentially distinct effects on economic performance (Serneels and Verpoorten, 2015: 558), as seen in Bodea and Elbadawi's (2008) work. Finally, as pointed out by Serneels and Verpoorten (2015: 558), there is a selection bias that stems from the fact that there are more data available for middle- and high-income incomes when compared to poor countries. In fact, the percentage of low-income and lower-middle-income countries in the five samples used in this chapter varies between 39% and 42%[98]. This may lead to an overestimation of the speed of recovery (Almer and Hodler, 2015: 2).

However, theory also suggests that there may be a positive link between the two variables. As pointed out in Serneels and Verpoorten (2015), the standard neoclassical growth theory suggests that in the years after civil conflict, an economy could grow relatively fast and converge to its steady state. Within the context of modern theory of growth, Olson (1982) has suggested that if war destroys vested interests existent in the society which block the adoption of new and superior technologies, than it can lead to a higher growth rate (Koubi, 2005: 70). Additionally, Organski and Kugler's (1977) Phoenix factor suggests that one might expect positive growth effects at the post-conflict stage, as a result of the reestablishment of economic activities; for example, the efforts of reconstruction may lead to boom in construction after the decrease in violence and insecurity (Vothknecht and Sumarto, 2011: 10).

Some earlier studies have found empirical support for this theory (e.g. Organski and Kugler, 1977). More recently, Przeworski et al (2000: 190) concur with the hypothesis of rapid post-war recovery by documenting that the average rate of growth during the five years following a war was 5.98% and during other years it was 4.15%. Similarly, Chen, Loayza and Reynal-Querol (2008) found an average growth rate of per capita GDP in conflict countries significantly higher before than after the war, by about 2.4 percent points. Given that economic growth in this thesis is measured through the compound

[98] According to the current World Bank classification.

growth rate over the different periods considered, thus disguising the short-run fluctuations in growth rates, the results obtained may be capturing some of these effects. Gutierrez-Sanin (2009: 22) discusses some "'anti-intuitive externalities' of violent conflict" and mentions some examples of recent cases where periods after a war have seen improved welfare and advanced state building (e.g. the victory of Yoweri Museveni's National Resistance Movement of a guerrilla war in Uganda in 1986 that was followed by a period of peace and economic development).

The analysis presented here concurs to some of these findings. One additional possibility for explaining the obtained results is the fact that the measure of political violence used encompasses indicators of repression in addition to indicators of civil war. I use two empirical examples to help to illustrate how one may then find a positive correlation between the index of political violence used here and economic growth. China and India are among the fastest growing countries in the recent decades. Yet, they show also high scores in terms of political violence.

India has a low score in physical integrity and has been considered as an abusive state, based on the violations of physical or personal integrity carried out by the state. In terms of ethnic conflict, the PITF (Marshall, Gurr and Harff, 2015) reports mass protests against the Indian rule erupting in violence in 1990 and continuing during the same decade. Additionally, several events related to the Maoist insurgency have been documented since 2001. Subscribing to a left-wing Maoist ideology and advocating pro-rural poor agenda, the origins of the insurgency have been traced back to the "Naxalite" movement.

China has also experienced growth under extractive institutions. The authoritarian regime scores low in terms of physical integrity and empowerment rights and high in political terror scale. The decades following the 1989 violent events in the Tiananmen Square have seen economic progress with rapid growth, but the political institutions became more extractive. For instance, reformers such as Zhao Ziyang, who provided support to the students in Tiananmen Square as general secretary of the Communist Party, were purged, and the government increased its actions to suppress civil liberties and press freedom (Acemoglu and Robinson, 2012: 440). The PITF (Marshall, Gurr and Harff, 2015) also reports episodic violent protests by Uighers in Xinjiang province against Han Chinese control escalating into terror by 1996, and which later spread to include targets outside Xinjiang. The Freedom House (2012) reports an upsurge of quasi-Maoist propaganda in 2011, and tens of thousands of protests during the same year against corruption, abuse of power and injustice, which were accompanied by increasing political repression (which had begun in 2008).

Although not included in the table, the analysis using spline regressions was roughly in line with the results presented previously (obtained without splines). I found some support for the claim of a negative significant effect of state ineffectiveness on growth. The coefficients obtained when placing the knots at different values of the variable seem to suggest that there is a non-linear effect of state ineffectiveness on growth. Improvements from a very low position in terms of this dimension to a moderate position lead to significant impacts on growth. However, one observes very little effect when considering movements at higher levels of this variable, i.e. from an effective state to a very effective state.[99] However, there was no indication of a significant effect for political violence.

Finally, a similar conclusion can be derived for hypothesis *H2*. When using cross-country data, the interaction term between state ineffectiveness and political violence holds a negative effect across specifications, but it is not significant in any of them. In the case of panel data, both the sign and the significance level of this coefficient vary depending on the type of dataset, period, and method considered. Overall, the estimations do not suggest that the effect of state ineffectiveness (or political violence) on economic growth in a country depends on the level of political violence (or state ineffectiveness).

4.7. CONCLUSION

This chapter presents new evidence on the impact of state fragility on economic growth. Despite the numerous accounts of the weight that state fragility bears on economic development provided by the reports of development agencies and previous studies, there is a relative scarcity of empirical work on this topic that makes use of cross-country regressions.

Following the tradition of using these methods to understand the determinants of growth, the analysis in this chapter explores the effect of the two dimensions of state

[99] This is in line with the concept of "good enough governance" advanced by Grindle (2007). The author argues that interventions by development actors should depart from the assumption that all governance or institutional gaps can be tackled at once, and move towards the identification of "minimal" conditions of governance that enable political economic development.

fragility identified in Chapter 3 – state ineffectiveness and political violence – on economic growth across countries. It is in line with previous literature considering the impact of related aspects, such as institutions, governance, or state capacity, as well as political violence, but aims to fill the gap that still exists in the studies focusing explicitly on the concept of fragile states.

I hypothesise that both of these dimensions have a negative impact on economic growth, and test this postulate making use of standard ordinary least squares techniques applied to datasets obtained from different data structures and time periods. The overall sample covers data for between 80 and 90 countries for the period 1993-2012. The analysis also accounts for potential biases by excluding outliers, including additional covariates, and taking the endogeneity of each of these dimensions into account.

I find a negative and significant impact of state ineffectiveness on growth, which is robust to the different data specifications used, as well as to changes in the data sample and list of explanatory variables. More specifically, the negative coefficient remains significant after including the ICRG as a measure of institutional quality, and also holds when different instrumentation techniques are used to address endogeneity.

The results for the coefficient for political violence do not suggest that there is a significant effect of this variable on growth. Even though one finds an unexpected positive and significant link in some specifications, the results vary in sign and significance, and have proven not robust, or even reversed, by new estimations and when different time periods are considered. Similarly, the results do not suggest that there is an interactive effect of this variable and state ineffectiveness on growth.

This analysis provides an additional important insight into the link between state fragility and growth. To the best of the author's knowledge, this is the first analysis showing that considering the two distinct aspects of state fragility unveils a link between fragility and growth, which is not necessarily visible if a unidimensional index is considered. When a single index of fragility obtained from the indicators identified in Chapter 3 was included in the growth regression to replace the separate indices for the two dimensions, one failed to find a consistent effect of this index on growth. This provides further support to the argument made in previous chapters that, in order to unpack the complexity of state fragility, one should consider its different dimensions separately. As shown in this chapter, they bear a very distinct effect on economic growth.

However, it is also important to recognise some limitations in the analysis. Firstly, the sample of countries included is reduced when compared to other analyses on fragile states, and the period covered is limited when compared to previous work using growth regressions. These two limitations are a result of the challenges in terms of data availability. On the one hand, this problem is more severe in empirical analyses looking at countries where the institutions of the state are not well functioning, as is the case of the countries with high levels of state ineffectiveness. On the other hand, several of the indicators used in the construction of the index for this dimension were obtained from the Worldwide Governance Indicators, which have data only from 1996 onwards, thus limiting the time scope of the analysis. Secondly, the strategies used to minimise the bias resulting from the endogeneity of state ineffectiveness and political violence are far from perfect. Still, it is my belief that they uncovered some interesting facts.

Finally, the results presented in this chapter also suggest important avenues for future research. The negative and significant link between state ineffectiveness and growth was already expected from the theoretical predictions as well as from previous work examining the link between economic growth and related variables. The generally non-significant, but sometimes significant and positive coefficient for political violence is more at odds with the predictions. Still, several empirical accounts for the effect of civil war on economic growth have demonstrated a positive effect, as described in the literature review earlier in this chapter. I suggest that further investigation of this relationship is still needed, with a closer scrutiny of the changes verified when different time periods are considered.

The support found for the use of these two distinct dimensions of state fragility when studying this phenomenon provides a second suggestion for future work. One of the main concerns of development agencies is over the effectiveness of development assistance, especially in the case of fragile states, as demonstrated in recent reports. The measurement tools derived from this and the previous chapter provide a new opportunity to examine how different dimensions of state fragility interact with the impact of aid on economic growth. I take on this challenge in the next chapter.

CHAPTER 5. THE IMPACT OF FOREIGN AID ON GROWTH IN FRAGILE STATES

5.1. INTRODUCTION

The results presented so far have suggested that state ineffectiveness has a significant negative effect on economic growth, whereas it has proven harder to find a distinctive significant effect of political violence. This chapter focuses on an indirect link through which state fragility may have an impact on growth. Namely, it scrutinises the hypothesis proposed in the empirical literature on aid effectiveness, which suggests that aid is only effective in countries pursuing good policies and with a good institutional environment. By definition, fragile states score lower in both of these dimensions, which suggests that aid will not be as effective in these countries. However, as explained before, the need to provide assistance to these countries has been justified in the donor community for over a decade now.

Thus, solving this dilemma would entail some crucial implications for donor policy. Even if there is an increasing abundance of qualitative evidence at the country-level, only a few studies have tested the argument that aid is deemed less effective in fragile states using cross-country data. The aid effectiveness analysis in Carment, Samy and Prest (2008) is preliminary and subject to several caveats (namely the control variables included and the estimation procedure). Although providing stronger accounts in terms of their empirical strategy, the work by McGillivray and Feeny (2008) and by Andrimihaja, Cinyabuguma and Devarajan (2011) is undermined by the fact that their definition of fragile states is based on thresholds of the CPIA, which, as discussed in previous chapters, overlooks the complexity of state fragility.

The main contribution of this chapter is to replace the use of the CPIA with an alternative measurement procedure, which consists of two indices that capture the dimensions of state fragility proposed in Besley and Persson (2011a) – state ineffectiveness and political violence. It also departs from previous approaches that consider a dummy variable for fragile states and suggests its substitution by a continuous variable for state fragility. This strategy allows one to determine whether, on average, there is any impact of state ineffectiveness, political violence, or both, on aid effectiveness. The robustness of these results is tested by considering different datasets, time periods and horizons, and distinct instrumentation strategies.

I am once again inspired by Besley and Persson's (2011a) model to provide the theoretical foundations for the testable hypotheses. I follow the tradition of the literature examining the aid-growth nexus, and add three interaction terms to the model formulation used in Chapter 4. Aid interacted with state ineffectiveness and the interaction between aid and political violence are introduced simultaneously, whereas a triple interaction term between aid and the two symptoms of state fragility is added later.

To give a preview of the results, in line with previous work, there seems to be no statistically significant impact of either state ineffectiveness or political violence on the effectiveness of aid in promoting economic growth. Additionally, the evidence does not suggest that aid is even less effective when the country has high scores in both of these dimensions. A secondary contribution is made to the empirical aid effectiveness literature. The results for the coefficient of the aid variable vary widely in sign and size, and are rarely significant, thus lending support to those studies that fail to find a statistically significant effect of aid on growth.

The remainder of this chapter is organised as follows. I begin by reviewing the related literature in the following section. Section 5.3 formulates the hypotheses and describes the empirical model used to estimate them. In section 5.4, I refer to the data used and to the results obtained from a preliminary analysis. The main results obtained with cross-country data and with panel data are presented, in turn, in section 5.5, which ends by discussing their robustness after performing a few checks. Finally, section 5.6 summarises the main conclusions and positions them in relation to the existing literature, before section 5.7 concludes.

5.2. LITERATURE REVIEW

Forty years of research on the impact of development aid have failed to reach a consensus on whether aid works or not. Recent results from meta-analysis of the aid-growth relationship mirror the long-standing disagreement in the empirical literature: while Mekasha and Tarp (2013) find a positive and statistically significant effect of aid on growth, Doucouliagos and Paldam (2008, 2011, 2013, 2014) claim that aid has been ineffective in promoting growth. A significant part of the existing studies argues that this effect is conditional on certain factors[100], not only on the demand side of aid, such as the macroeconomic policies or the level of institutional quality in the recipient country, but also on the supply side, e.g. donor motives or aid volatility.

The aid conditionality literature is the starting point for the review presented in the next paragraphs, giving more attention to the studies that found the effect of aid to be dependent on the type of policies and the quality of institutions in a country. The reason behind this is the conundrum of aid to fragile states described previously in this thesis, which I recap here. On the one hand, the need to engage with these countries has been recognised by the international community due to the costs and dangers they impose on their citizens, neighbouring countries, but also on a global scale. However, given the characteristics of fragile states (described in detail in chapter 2), aid is presumed to be less effective in these countries. More specifically, according to the insights provided by the aid effectiveness literature, "bad" policies and institutions have a detrimental effect on the impact of aid on growth. Even if not directly alluding to this group of countries, the studies examining this interaction are described in more detail below.

After this, I narrow the focus to existing empirical analyses that look at aid to fragile states. I firstly briefly refer to the works examining aid allocation trends, which explore whether these countries receive more or less aid than predicted according to their policy and institutional level. I then move to the few empirical papers that explicitly address the impact of aid on growth in fragile states, some of which only include tentative preliminary analysis. This overview highlights the limitations of these studies and identifies the gap in knowledge this chapter aims to fill.

The final two parts of this section offer a short outline of the challenges that one faces when analysing aid effectiveness, and refer to a group of studies proposing to look at different categories of aid, a possibility that is also explored later in the empirical analysis.

5.2.1 Conditional aid effectiveness

The interest in the effect of aid on growth dates back to the early 1970s, when the first studies started to emerge. Since then, the increase in data availability and the

[100] See Doucouliagos and Paldam (2010) for a meta-study of the literature focusing on conditional aid effectiveness.

improvement in estimation methods have led to a plethora of studies examining the aid-growth link. Given the extensiveness of the empirical literature on aid effectiveness and the fact that there is a reasonably large group of thorough reviews on this topic (e.g. Temple, 2010), I here provide a general overview of existing work, zooming in on those studies more relevant for the purposes of this chapter.[101]

Hansen and Tarp (2000) have identified three generations of empirical research on the impact of aid on growth. The early studies in the first two generations (the first dating back to the early 1970s, and the second spanning from the 1980s until the early 1990s) were based on the Harrod-Domar growth model and the two-gap Chenery-Strout extension. Overall, the results lent support to the idea of a positive impact of aid on growth. In the early 1990s, a new generation of studies began, characterised by the application of more advanced econometric techniques and more realistic assumptions about this link.[102]

One of the views that emerged during the late 1990s and early 2000s was that the effect of aid was conditional on certain factors, such as: i) the type of policies (e.g. Burnside and Dollar, 2000); ii) the institutional quality (e.g. Burnside and Dollar, 2004; Baliamoune-Lutz and Mavrotas, 2009); iii) the political system and its stability (e.g. Svensson, 1999; Chauvet and Guillaumont, 2003); but also iv) external and climatic factors, namely, trends in terms of trade, short-term export instability, and natural disasters, among others (e.g. Guillaumont and Chauvet, 2001; Collier and Dehn, 2001; Collier and Goderis, 2009); as well as v) the geographic conditions of a country (e.g. Dalgaard, Hansen and Tarp, 2004); and, finally, vi) the level of social capital (e.g. Baliamoune-Lutz and Mavrotas, 2009). The insignificant effect of aid found in a number of studies has been explained by some with the fact that aid has non-linear effects, i.e. aid has diminishing returns due to a limited absorptive capacity of recipient countries to take up large inflows of foreign capital (e.g. Hansen and Tarp, 2001; Lensink and White, 2001; Dalgaard and Hansen, 2001; Chauvet and Guillaumont, 2003).[103]

[101] Previous reviews include, but are not restricted to, White (1992), Hansen and Tarp (2000), Hermes and Lensink (2001), Morrissey (2001), Easterly (2003), Clemens, Radelet and Bhavnani (2004b), McGillivray et al. (2006) and Radelet (2006), and, more recently, Glennie and Sumner (2014), Sumner and Glennie (2015) and Addison, Morrissey and Tarp (2017).
[102] I refer to Hansen and Tarp (2000) for more detail on these generations of studies.
[103] Roodman (2007a) performed robustness checks to seven prominent studies in this generation, including Burnside and Dollar (2000), and found their results to be fragile, especially to sample expansion. With a similar purpose, Jensen and Paldam (2006) test the robustness of the studies applying the “Good Policy Model” (i.e. including the interaction term aid×policy) and studies using the “Medicine Model” (i.e. including a coefficient for aid^2), by simplifying the models and replicating the analyses with the inclusion of more data. The results

Another strand of literature has focused on the supply side and examined the effects of donor motives (e.g. Kilby and Dreher, 2010), aid proliferation (e.g. Kimura, Mori and Sawada, 2012), aid fragmentation (e.g. Annen and Kosempel, 2009) and aid volatility (e.g. Lensink and Morrissey, 2000; Hudson and Mosley, 2008; Chauvet and Guillaumont, 2009) on its effectiveness. Others have contributed to the understanding of the aid-growth link by analysing the effect of aid according to its composition (e.g. Rajan and Subramanian, 2008; Minoiu and Reddy, 2010; Clemens, Radelet and Bhavnani, 2004a), or by tracking other outcomes, such as education or health improvements (e.g. Gomanee et al., 2005; Michaelowa and Weber, 2006; Dreher, Nunnenkamp and Thiele, 2008; Mishra and Newhouse, 2009; Arndt, Jones and Tarp, 2011, 2015a)[104], but also growth accelerations (e.g. Dovern and Nunnenkamp, 2007).

As highlighted in previous chapters, existing definitions of fragile states are frequently based on dimensions of capacity, legitimacy, authority, and sometimes effectiveness, of the state, and more often than not operationalise the concept by considering countries with a CPIA level below a certain threshold (depending on the definition used). These approaches can thus be linked to the literature looking at the effect of policy and institutions on the impact of aid in promoting growth, which are frequently proxied by the CPIA levels. I highlight some of the most prominent studies below.

Burnside and Dollar's (2000) seminal work suggested that aid had a positive effect only in countries pursuing "good" policies, where policy is measured by an index derived from the variables trade openness, inflation, and budget balance as percentage of GDP. This result found support in other studies (such as Collier and Dehn, 2001, or Collier and Dollar, 2001, 2002[105]), and policy recommendations by international aid agencies, such as the World Bank, echoed the view that allocating aid to "good performers" would promote aid effectiveness in spurring growth[106]. Still, Burnside and Dollar's study was also heavily criticised and triggered responses from different scholars who cast doubt on the robustness of their results (among others, Dalgaard and Hansen, 2001; Hansen and Tarp, 2001; Guillaumont and Chauvet, 2001; Easterly, 2003; Easterly, Levine and Roodman, 2004; Antipin and Mavrotas, 2006). More recently, using policy indicators as threshold variables, Alia and Anago (2014) found that a good macroeconomic policy

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from within-sample replications indicate that the first of these models is fragile whereas the second is robust. Still, both models fail in out-of-sample replications.

[104] See Glennie and Sumner (2014) for a more detailed review of the literature looking at the impact of aid on education, health and monetary poverty reduction.

[105] In all three studies, the CPIA is used as a measure of the policy level.

[106] See the report *Assessing Aid* (World Bank, 1998). Collier and Dollar (2002) build upon this idea and present poverty-efficient aid allocation levels.

does indeed have an effect on the impact of aid on growth. They conclude that this impact will be higher in an economy with sound monetary policies that translate into low inflation rates, small budget deficit and a relatively high level of trade openness (i.e. under liberal trade policies in opposition to a rather closed economy).

A related argument contends that the level of institutional quality of a country will mediate the impact of aid on growth. Burnside and Dollar (2004) have also later examined this effect and found some evidence that aid promotes growth conditional on institutions. In order to measure the extent to which institutions and policies in a country promote a good environment for entrepreneurship and growth, the authors use the Kaufmann, Kraay and Zoido-Lobaton (1999) index of institutional quality[107]. However, using the ICRG (Knack and Keefer, 1995) as an alternative measure of quality of government institutions, Collier and Dollar (2002) found that this effect is small and negative, but only marginally significant. With a focus on political regimes, the results found by Svensson (1999) concurred to the argument that aid is conditional on the degree of political and civil liberties, and, more specifically, that the impact of aid was positive in more democratic countries. Using a composite index of socio-political instability[108], Chauvet and Guillaumont (2003) add that aid effectiveness is negatively influenced by an unstable and uncertain political environment. Despite the use of a different procedure to obtain an index of political instability[109], Islam (2005) finds support to this relationship.

This finding is corroborated by Baliamoune-Lutz and Mavrotas (2009), who conclude that good institutions have a positive impact on aid effectiveness by looking at the coefficient of the interaction between aid and the ICRG institutional quality index. However, this claim is challenged by Dovern and Nunnenkamp (2007: 378), who report a significant positive effect of aid on growth accelerations in “bad states”, i.e. countries with a level of the Polity IV index worse than the median for all sample countries in the particular year.

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[107] This includes the six clusters of variables which still serve as a basis for the Worldwide Governance Indicators provided by the World Bank. Namely, voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption (Kaufmann, Kraay and Mastruzzi, 2003).
[108] Resulting from a weighted sum of the number of coups d’état, of the demonstrations and of a dummy equal to one when a civil war breaks out (Chauvet and Guillaumont, 2003: 10-11).
[109] This index results from a linear combination of assassinations, coups d’état, revolutions, riots and strikes, whose weights are determined according to the impact of these variables on growth.

Economides, Kalyvitis and Philippoppoulos (2008) lend support to the view that aid causes rent seeking, which in turn reduces the net growth effect of aid, but this effect is significant only in recipient countries with relatively large public sectors. They use a composite measure of rent seeking that comprises the scores of corruption in government, rule of law, risk of repudiation of government contracts, risk of expropriation, and quality of bureaucracy. Looking at the role of local elites, Angeles and Neanidis (2009) claim that the local elite determines how much of the aid inflows are diverted or reach its final goal, thus influencing the benefits that can be obtained from foreign aid. The results from empirical analysis demonstrate that the aid-elite multiplicative term is negative and significant, thus concurring to their argument. Additionally, according to these authors, countries having a colonial past and being the object of large European settlement would constitute a "risk group" in terms of aid effectiveness (Angeles and Neanidis, 2009: 133). Focusing on the impact of the degree of decentralisation on the effect of aid in promoting growth, Lessmann and Markwardt (2012) find a negative and significant coefficient of the interaction of aid with a decentralisation measure, and thus conclude that aid has a positive contribution in more centralised developing countries, but is less effective, or even harmful, in more decentralised economies.

5.2.2. Aid effectiveness conditional on state fragility

The literature on aid to fragile states has expanded in the last decade. Following from the concerns expressed by development agencies, there was a surge in reports focusing on proposals on how to "work more effectively in fragile states" (DFID, 2005), on how to "achieve development effectiveness in weakly performing countries" (Asian Development Bank, 2007), on "strengthening [a] rapid response and long term engagement" (World Bank, 2007), and on what principles to follow for a "good international engagement" (OECD, 2007) in these countries. The European Report on Development (2009) was crucial to the framing of the European approach. Later there was an agreement between key international actors[110] on a new framework for working in fragile contexts, formulated in a *New Deal for engagement in fragile states* (IDPS, 2011) to be implemented in a trial period in 2012-2015.

[110] These include the g7+ group of 19 fragile and conflict-affected countries, development partners, and international organisations.

The academic studies have a more specific character, focusing on the effects of assistance, and in most cases intervention, in particular countries.[111] This topic has attracted the attention of political scientists, whose discipline included an already well-established literature focusing on service delivery, and on the promotion of state-building and peace-building in this context.[112] The qualitative literature is thus more extensive than the quantitative work. This chapter aims at contributing to the latter. The following paragraphs review the academic studies[113] addressing the links between aid, state fragility, and economic development using quantitative methods.

The main contribution of the initial studies on aid to fragile states was drawing attention to the need to improve engagement with these countries, highlighting, on the one hand, the costs they imposed (Chauvet and Collier, 2004; Chauvet, Collier and Hoeffler, 2007), and, on the other, the divergence between predicted and actual aid levels to these countries (Levin and Dollar, 2005; Jones, Riddell and Kotoglou, 2005).[114] Jones, Riddell and Kotoglou (2005) notice an increase in the amount of aid to "difficult partnership" countries in the early 2000s, though it was biased towards certain countries regarded as of wider global or regional importance. Levin and Dollar (2005) highlight the fact that there were significant differences within this group, and that while some countries, labelled "darlings", received more aid than the CPIA levels would predict, others – the "aid orphan" group – were receiving less than the predicted aid levels (Levin and Dollar, 2005).[115] Carment, Samy and Prest (2008) argue later, that, based on the values of aid per capita and in comparison with the overall sample of countries, fragile states[116] are underfunded. Still, the authors also suggest that they continue to be aid dependent, as the value of aid expressed as a percentage of gross national income has not changed significantly. Their analysis of the determinants of aid allocation suggests that authority and capacity are the main factors affecting the policy decision-making process.[117]

[111] Recent examples include Menkhaus (2014), Zürcher (2012), or Arandel, Brinkerhoff and Bell (2015). See also Gisselquist (2014) for a comparative analysis of the effects of aid on institution-building in fragile states.
[112] I refer to Mcloughlin (2012) and to the UNU-WIDER (2014) position paper for literature guides. See also Leader and Colenso (2005), and examples of recent work include, but are not restricted to, Batley and Mcloughlin (2010), Woolcock (2014), Baudienville (2010), Ishihara (2012), and Faust, Gravingholt and Ziaja (2015).
[113] I review both published journal articles as well as working papers, given that the latter form most of the existing literature.
[114] See Ellison (2016) for an overview of the debate on aid allocation to fragile states.
[115] See McGillivray (2006) for a more extensive review of these studies.
[116] Fragile states are the top 40 countries in the ranking built by these authors, based on their ALC approach (Carment, Prest and Samy, 2008).
[117] See also Carment, Prest and Samy (2008), who examine trends in aid for the period 1969-2003 and conclude that, compared to the overall sample, fragile states – as measured by the

Following from the increasing awareness of the need to assist fragile states, and of the dangers of not doing so, the attention shifted to determine what type of development assistance was more effective in these countries. Chauvet and Collier (2004, 2006) provide some insights into what may be the most appropriate and effective sequence of aid instruments to increase the chances of a sustained turnaround in failing states, defined according to the CPIA criteria[118]. More specifically, they find that technical assistance has a significant positive effect on the prospects of turnaround in failing states, in contrast with aid as finance, which has a significant adverse effect (Chauvet and Collier, 2008).[119]

In a different approach, Feeny and McGillivray (2009) explore the "growth efficient" levels of foreign aid to fragile states. Classifying as fragile those countries with a CPIA score that falls in the two bottom quintiles, the authors conclude that some countries have received more, and others less, than the amount of aid that should be provided in order to maximise current growth in these countries.

Following the line of the aid effectiveness literature reviewed in the previous subsections, a few econometric studies have attempted to take the effect of state fragility into account. McGillivray and Feeny (2008) test the hypothesis that an inflow of aid to, or the interaction between aid and policies in, a fragile state will lead to less growth than in a non-fragile state. According to their specification, the aid x fragility term tested whether a score in the bottom two quintiles of the CPIA (or a country that has not been rated) had an impact on the effectiveness of aid. The authors consider a sample of 113 countries for the period 1977 to 2001, and use a two-step system GMM estimator. They found this term not to be statistically significant from zero. The results remained similar when allowing for different thresholds of the CPIA, but the estimated coefficient became significant when the threshold level was set to belonging to the bottom CPIA quintile. Based on this, they concluded that they do not find support for two of the hypotheses, namely: i) that the quality of policies and institutional performance is of additional

aforementioned index created by the authors – are underfunded and that aid volatility has increased over time.

118 Failing states are countries classified as a low-income country for at least one year by the World Bank, and that had a level of the CPIA under 2.5 for at least 4 consecutive years. A turnaround is achieved by attaining a level of at least 3.5 in the CPIA, and a turnaround is deemed sustained if the CPIA remains above 3 for at least 2 years after the turnaround is achieved.

119 Given the characteristics of fragile states, a link can also be made with studies looking at post-conflict situations. For instance, Collier and Hoeffler (2004b) found that growth is more sensitive to policy in these situations (using the CPIA as a measure of policy), and that social policies should be prioritised to sectoral policies and macro policies.

importance in countries with critically low CPIA scores; or that ii) only a level of performance below a certain threshold has an impact on aid effectiveness. However, they conclude that there are differences in aid effectiveness when one compares fragile states with highly-fragile states (those belonging to the bottom CPIA quintile).[120]

In using the CPIA as an indicator to derive the lists of fragile states, Chauvet and Collier (2004, 2006, 2008), McGillivray and Feeny (2008) and Feeny and McGillivray (2009) can be linked with the earlier aid effectiveness literature that employed this measure provided by the World Bank to assess the level of policy environment in a country. To give one example, Collier and Dollar (2002) test whether the effectiveness of aid is more effective in raising growth in countries with a better policy environment using this measure as the indicator for policy. In addition to considering aid and policy as explanatory variables in a standard growth regression, they also include an interaction term between policy and aid. In so doing, they come close to the analyses described so far.[121] The main differences are that: i) this indicator is not used to derive lists of countries that score under a certain score, but instead employed as a continuous variable; ii) there is no reference to the countries that have lower scores as being classified as "fragile".

Carment, Samy and Prest (2008) propose their own measure of fragility, derived as an overall score based on country performance in authority, legitimacy and capacity, described in previous chapters. In a preliminary application of this measure, and using cross-sectional data, they consider the countries with a score of 4 or above in their measure of fragility. In their baseline regression, the term aid x fragility tests the hypothesis that the impact of aid is different in fragile states. The authors then restrict their sample to include only countries with an overall score higher than 5, and then to countries with a score higher than 6 in a subsequent specification. According to the estimates for the coefficient of aid, there is a positive and significant effect of aid and this effect increases with the level of fragility, which leads the authors to conclude that "aid has a larger impact on growth in more fragile states, ceteris paribus" (Carment, Samy and Prest, 2008: 366). However, even though briefly discussing the results obtained for the interaction term, the authors overlook its meaning for the interpretation of the results. To be clear, the estimated coefficient for the aid*fragility term is negative and

[120] Focusing on small island developing states (SIDS) and using these two thresholds for fragility, the same authors found no evidence of a different effect of aid on growth in fragile and non-fragile SIDS. However, the results also indicated that this impact was lower in highly fragile in SIDS than in all others.
[121] Their analysis is further developed in Collier and Hoeffler (2004b).

significant in the three samples, being more significant in the sample of the most fragile countries.

Following the World Bank's criteria to identify fragile states[122], Andrimihaja, Cinyabuguma and Devarajan (2011) also find a positive and significant relationship between foreign aid and economic growth. The dataset comprised data for the period 1980-2010 for about 120 countries, and both OLS, FE and IV estimators were applied. These authors also include an interaction term between aid and a dummy for fragile states, but add in a different specification an interaction between aid and a dummy for African fragile states. In the case of the first, the coefficient is positive and non-significant, and the sign and coefficient for aid remains unchanged (positive and significant). The same holds when the second interaction term is considered instead. The small positive effect between aid and African fragile states becomes significant only when the authors add a dummy for African fragile states. The authors interpret this result as an indication that "ODA [official development assistance] continues to exert an independent effect on growth in African fragile countries" (Andrimihaja, Cinyabuguma and Devarajan, 2011: 25).

To the best of the author's knowledge, the last three empirical papers represent the only existing attempts to determine the link between aid and economic growth in fragile states following the tradition of the aid effectiveness literature. Carment, Samy and Prest's (2008) appraisal is, as recognised by the authors, a preliminary analysis, which is subject to several caveats (namely the control variables included and the estimation procedure). The work in both McGillivray and Feeny (2008) and Andrimihaja, Cinyabuguma and Devarajan (2011) is stronger in terms of the empirical strategy, but is undermined by the fact that their definition of fragile states is based on thresholds of the CPIA, which, as discussed in previous chapters, overlooks the complexity of state fragility. Thus, I argue that i) given the widely recognised (and justified) interest in better understanding how to engage in fragile states, and ii) the possibilities offered by the use of econometric techniques to look at macro effects, as demonstrated in the review of the aid effectiveness literature in the beginning of this section, there is a potential to expand the existing work. This is the aim pursued in the remainder of this chapter, but, before that, I briefly summarise some of the difficulties faced when examining aid effectiveness.

[122] Fragile states are those with an overall score of 3.2 or below on the CPIA (World Bank, 2017b).

5.2.3. The challenges of establishing causality in aid effectiveness studies

Arndt, Jones and Tarp (2009, 2010) have identified a recent generation of studies that cast doubt on the methodology employed in previous literature. More specifically, the criticism is related to their instrumentation strategies and to the unwitting way that GMM estimations are used (Frot and Perrotta, 2012: 2).

Rajan and Subramanian's (2008) study, one of the most influential papers in this generation, shows little evidence of an effect (positive or negative) of aid on growth, even after submitting their specification to a series of robustness checks. These authors have attempted to overcome some of the limitations associated with cross-country regressions by proposing a comprehensive approach that includes a new instrumentation strategy, accounts for different time horizons and periods as well as different sources, types and timings of aid, and which considers different specifications and samples. Their conclusion is corroborated by Dreher and Langlotz (2016). Still, several others continue to find a positive, even if modest, effect of aid on growth (e.g. Arndt, Jones and Tarp, 2010, 2015a; Frot and Perrota, 2012; Clemens et al., 2012; Galiani et al., 2014; Jackson, 2014).

The debate around the causal link between aid and growth remains unresolved. Roodman (2007b) attributes the lack of agreement in the literature to the challenges of demonstrating causation, and to the fact that, despite the increasingly sophisticated techniques that have been developed to overcome them, there is a danger that these can potentially magnify an old peril in econometrics, the "black box problem".[123] Almost a decade later, this account remains pertinent. Simultaneous causation, omitted variables, and mis-measurement still feature among the issues confounding the causality between aid and growth identified by Glennie and Sumner (2014: 19) in their review of cross-country peer-reviewed, econometric studies on aid effectiveness. However, recent studies offer new possibilities to deal with the challenges inherent to attempting to establish the causality between aid and growth and new perspectives on how to measure the progress on development assistance (see, for instance, Qian, 2015, for a review). I return to the first of these issues in section 5.4.3.

[123] Roodman (2007b) also discusses publication bias as a third cause of the existing controversy. I leave the discussion of this element aside, but refer to the paper as well as to Glennie and Sumner (2014) for more detail on this.

5.2.4. Disaggregation of aid

A few authors have challenged some assumptions adopted in the aforementioned studies, namely that aid has a unique contemporaneous effect on growth, and that different kinds of aid have the same effect by looking at different types of development assistance. Bearing this in mind, some proposals argue that aid should be disaggregated into different types.

Clemens et al.'s (2012) proposal[124] was a seminal contribution in terms of disaggregating aid into different categories. Their idea was to identify the elements of aid whose impacts are more likely to be manifested in the short run, thus focusing on the timing of the effect. For that purpose, the authors distinguish between: i) "short-impact" aid, which includes the expenditures whose effects might be observed within roughly four years[125]; ii) "long-impact" aid, encompassing technical cooperation and most social sector investments; and iii) "humanitarian" aid, which includes emergency assistance and food aid (Clemens, Radelet and Bhavnani, 2004a: 13). They then use "early-impact" aid, a restricted variable that considers the share of aid that is expected to have an impact on growth within the relevant time period. Based on the obtained results, the authors conclude that there is a positive impact of aid on growth on average across all countries, "but is limited and quite modest in comparison with other determinants of growth, and is negative in some countries" (Clemens et al., 2012: 591).

Yet, Dreher and Langlotz (2016) draw attention to the fact that Clemens et al.'s (2012) estimates may be biased. In another replication exercise, Roodman (2015) casts doubt about the robustness of Clemens et al.'s (2012) claim, and argues that the contemporaneous endogeneity in their work is not completely removed by the approach these authors propose. Bjornskov (2013) adds to the discussion by using factor analysis to obtain a categorisation of aid[126] and by comparing it to the results obtained with Clemens et al.'s (2012) proposal. The author concludes that overall aid has no effect on growth, though reconstruction aid shows direct positive effects.

124 Initially published as a working paper (Clemens, Radelet and Bhavnani, 2004a, b).
125 According to the authors, it includes "budget support or 'program' aid given for any purpose and project aid given for real sector investments for infrastructure or to directly support production in transportation (including roads), communications, energy, banking, agriculture and industry", but excludes "any aid flow that clearly and primarily funds an activity whose growth effect might arrive far in the future or not at all (…)" (Clemens et al., 2012: 598-599).
126 The author distinguishes between aid for economic purposes, social purposes, and reconstruction.

Some other proposals have disaggregated aid according to its purpose. Following the classification methodology of Clemens, Radelet and Bhavnani (2004a, b), Neanidis and Varvarigos (2009) distinguish between productive aid and pure aid, and add to the literature on the aid-growth link by accounting for the effect of volatility in the aid flows. Productive aid includes assistance given to improve the public services and the physical and social infrastructure of the economy, whereas pure aid encompasses food aid and monetary relief in critical situations, such as bad harvests or reconstructions (Neanidis and Varvarigos, 2009: 452-453). They conclude that the former has a positive effect on growth, while the later has a negative impact. In contrast with this, the volatility of productive aid reduces growth, but the volatility of pure aid increases growth.

Annen and Kosempel (2009) disaggregate aid into technical assistance, provided in the form of a knowledge transfer with the aim of improving productive capabilities in the recipient country, and non-technical assistance, which consists on an income transfer that can be used in addition to the available resources for consumption and investment. Based on their theoretical analysis of the link between aid and growth, built upon a neo-classical growth model, the authors predict that technical assistance will promote growth through its effect on productivity, regardless of whether it is perceived as permanent or temporary (Annen and Kosempel, 2009: 3). In contrast, non-technical assistance, if perceived as permanent, will not contribute to increased growth given that it will be entirely consumed (Annen and Kosempel, 2009: 3). Technical assistance is proxied by the variable of technical cooperation, as defined by the OECD, and non-technical assistance is obtained by using current and actual transfers, and excluding debt forgiveness grants and capitalised interest, food and emergency aid, and technical assistance. They find that, in contrast with non-technical assistance, technical assistance has a positive and significant impact on growth, except in countries where it is highly fragmented, where the estimated effect is zero.

Headey (2008) proposes to remove separately reported humanitarian aid from the ODA disbursements data in order to obtain a measure of aid that is ultimately intended to promote growth. Additionally, the author also considers the type of donor, and distinguishes between multilateral, bilateral, and repayment aid flows. The results indicate that multilateral aid has been, on average, more effective than bilateral aid in promoting growth.

Focusing on aid modalities, Ouattara and Strobl (2008) use a distinction between project aid, financial programme aid, technical assistance, and food aid to test the specifications used in Burnside and Dollar (2000), Hansen and Tarp (2001) and Dalgaard, Hansen and

Tarp (2004). The results obtained from system GMM indicate that only project aid has a significant positive effect on growth, whereas financial programme aid has a negative effect. The authors found no significant effect for the latter two types of aid.

Rajan and Subramanian's (2008) study covers three types of disaggregation, according to the timing of the effects (late-impact and early-impact), the purpose of aid (social and economic aid)[127], and also the type of donor (multilateral and bilateral aid). Overall, the authors do not find a significant effect of any of the subcategories of aid on growth.

Minoiu and Reddy (2010) contribute to this strand of the literature by focusing on donor motivations and distinguishing between developmental and non-developmental aid. Development aid is defined as "aid expended in a manner that is anticipated to promote development, whether achieved through economic growth or other means", and is operationalised by pooling bilateral aid flows from "development-friendly" donor countries, selected on the basis of aid-quality donor rankings (Minoiu and Reddy, 2010: 29). Non-developmental aid is obtained by deducting multilateral aid and development aid from total aid. The obtained coefficients show that developmental aid has a positive and robust impact on growth in the long-run.

This chapter starts by examining the impact of total aid flows. Still, the insights from these studies are also taken into account at a later stage, and in section 5.5.3 I examine whether different categories of aid have distinct effects on economic growth in fragile states.

5.3. HYPOTHESES, EMPIRICAL MODEL AND DATA

5.3.1. Theoretical framework and hypotheses

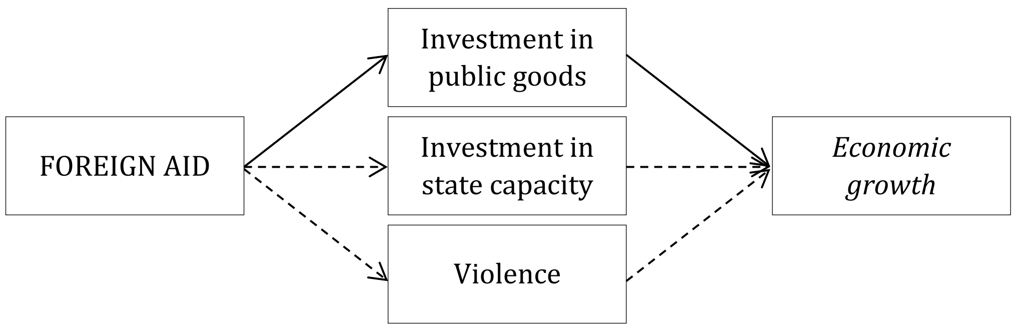
Similarly to the previous chapters, I follow Besley and Persson's (2011a) framework, but now focus on the analysis of the impact of development assistance in light of their model of state fragility. These authors abstract from the role of strategic objectives in determining donor motives to provide aid, and from issues of coordination by focusing on a single intervention, i.e. a transfer of resources from a foreign government or

[127] Hirano and Otsubo (2014) also propose a division according to the sectors of destination of aid, and assess the effect of social aid (i.e. aid directed at social infrastructure and services) and of economic aid (aid to economic infrastructure), in comparison to the impact of aggregate aid on economic growth.

organisation to the government of a developing country (Besley and Persson, 2011a: 387). The interest is in examining the effects that this transfer of resources has on the recipient government, and, eventually, on the welfare of the citizens of the country.

The model suggests that aid can contribute to increased welfare. Given the aims of the analysis, welfare will be broadly equated with economic growth. Aid can contribute to promoting economic growth directly through the provision of public goods, and indirectly through investment in state capacity. It can also have a detrimental effect through an increase in the likelihood of violence. These links are schematically represented in Figure 18. The focus of this chapter is on the first of these links.[128] Together with the insights provided in the literature reviewed in the previous section, these served as inspiration to derive the hypotheses to be tested in the next sections, and which I describe in more detail below.

Figure 18. Mechanisms linking foreign aid and welfare, according to Besley and Persson (2011a)



Notes: Full lines represent direct links and dashed lines represent indirect links.

I first consider the hypothesis suggested by early studies on aid conditionality that aid is deemed to be less effective in fragile states, tested in the studies reviewed at the end of section 5.2. In other words:

> *H1: Aid is less effective in promoting economic growth in countries with a higher degree of state fragility.*

[128] Even though I recognise the importance of examining the other two channels through which aid may have an impact on growth, for reasons of space, these are not explored in this thesis, and I suggest this extension for future work. However, as described below, the regressions in this chapter control for state ineffectiveness and political violence, thus ruling out these links. For reviews of existing studies examining similar relationships, I refer to Clist and Morrissey (2011) and Morrissey (2012), who focus on the effect of aid on government spending and tax effort in developing countries, and to Findley et al. (2011), who offer an overview of the quantitative literature on the effect of foreign aid on conflict dynamics.

Following the idea of considering the effects of the two symptoms separately, I subdivide this hypothesis into two:

H1.1: Aid is less effective in promoting economic growth in states with higher levels of state ineffectiveness.

H1.2: Aid is less effective in promoting economic growth in states with higher levels of political violence.

The second hypothesis derived by Besley and Persson's (2011a) model is that aid is more effective in promoting economic growth in weak or redistributive, but peaceful states, than in states with repression or civil war. This proposition suggests the examination of an interactive effect between aid and the two symptoms of state fragility. This can be formulated as follows:

H2: Aid will be even less effective in promoting growth in countries with a combination of state ineffectiveness and political violence.

To the best of the author's knowledge, this hypothesis has not been examined in previous studies. The following section describes the empirical strategy employed to test these postulates.

5.3.2. Empirical model

This chapter follows closely the empirical formulation used in Chapter 4, which I briefly recall here. I used as a baseline the standard growth equation, largely used in the aid-growth literature, to which I added the two fragility indices as well as their interaction. I now also include the term for aid:

$$g_i = \alpha + \beta \log y_{i,0} + \gamma_1 si_i + \gamma_2 pv_i + \gamma_3 si_i \times pv_i + \gamma_4 a_i + \delta X_i + \varepsilon_i \qquad (4)$$

where g_i is the per capita real GDP growth rate, α is a constant, $\log y_{i,0}$ is the logarithm of the initial level of per capital real GDP, X_i includes the control variables described in more detail below, and ε_i represents the residuals. The additional terms si_i and pv_i are the indices for state ineffectiveness and political violence, respectively, and their interaction is represented by the term $si_i \times pv_i$. Finally, a_i represents development aid receipts.

The interest of this chapter lays now in determining how the level of state fragility in a country influences the impact of aid on growth. Bearing this in mind, and following a similar approach to previous studies, I introduce the interaction of each state ineffectiveness and political violence with aid. Thus, the new formulation is:

$$g_i = \alpha + \beta \log y_{i,0} + \gamma_1 si_i + \gamma_2 pv_i + \gamma_3 si_i \times pv_i + \gamma_4 a_i + \gamma_5 a_i \times si_i + \gamma_6 a_i \times pv_i + \delta X_i + \varepsilon_i \quad (5)$$

The main interest will be in analysing the sign and significance of the coefficient for aid, γ_4, but mainly of the coefficients for the interaction terms, γ_5 and γ_6. They tell us about aid effectiveness and to what extent it varies with the degree of state fragility. In order to test *H2* I add an additional interaction term:

$$g_i = \alpha + \beta \log y_{i,0} + \gamma_1 si_i + \gamma_2 pv_i + \gamma_3 si_i \times pv_i + \gamma_4 a_i + \gamma_5 a_i \times si_i + \gamma_6 a_i \times pv_i + \gamma_7 a_i \times si_i \times pv_i + \delta X_i + \varepsilon_i \quad (6)$$

The coefficient γ_7 represents whether the effect of aid on growth is dependent on the existence of both state ineffectiveness and political violence in combination.

In using the two distinct indices to proxy for the dimensions of state fragility proposed in Chapter 3, I depart from the existing cross-country studies looking at aid effectiveness in fragile states in three elements. First, I use the two dimensions separately, instead of including an interaction term of aid with a single unidimensional measure of fragility. Second, these indicators are not based on CPIA scores, thus overcoming the limitations of using this index to identify fragile states (as discussed in section 2.4). Finally, I move away from a binary approach to state fragility that considers that a country is either a fragile or a non-fragile state. McGillivray and Feeny (2008) and Andrimihaja, Cinyabuguma and Devarajan (2011) (discussed in section 5.2.2) use dummy variables to account for fragility, whereas the two indices employed here are continuous variables.[129]

Although not directly the aim of this chapter, the analysis in the following sections also describes the results obtained for the coefficient of aid before any interaction terms are included, i.e. the coefficients resulting from estimating equation (4). Not only does this allow for a comparison with the aid effectiveness literature, but it also enables one to observe any changes in the aid term after the interaction effects are taken into account. Before describing the data used in the empirical analysis, I summarise the hypotheses tested, the corresponding links, and the respective coefficients of interest in Table 56.

[129] It is important to clarify that previous cross-country studies examining the conditional effect of aid on growth have interacted the former with other continuous measures of policy environment and institutional quality (e.g. CPIA, ICRG …). The above comment refers only to those studies explicitly using the framework of fragile states.

Table 56. Summary of specifications

Hypothesis	Link(s) tested	Coefficient (Expected sign)
H1.1. Aid is less effective in promoting economic growth in states with high levels of state ineffectiveness. *H1.2: Aid is less effective in promoting economic growth in states with high levels of political violence.*	State ineffectiveness ↓ Aid ⟶ Growth ↑ Political violence	γ_5 (−) γ_6 (−)
H2: Aid will be even less effective in promoting growth in countries with a combination of state ineffectiveness and political violence.	State ineffect. ⟷ Political violence ↓ Aid ⟶ Growth	γ_7 (−)

5.3.3. Data

Rajan and Subramanian's (2008) contribution to the aid effectiveness empirical literature has been praised for the comprehensiveness of their analysis, which assesses the effect of aid on growth using different time horizons and periods, sources, types, and timing of aid, and varied specifications and samples. Following the line of previous studies (Arndt, Jones and Tarp, 2010; Clemens et al., 2012), I use this benchmark study as a baseline. The first set of results included in this chapter is obtained using Rajan and Subramanian's (2008) original dataset, which is publicly available, and simply adding, in stages: 1) the two indices representing the symptoms of state fragility – state ineffectiveness and political violence, as well as their interaction; and 2) their interactions with aid. In the tables included in the following section "RS08 original" will correspond to this dataset.

Next, I attempt to reconstruct Rajan and Subramanian's (2008) dataset, in order to extend the period of analysis, by obtaining data from, as far as possible, the same sources used by these authors. The majority of the variables in the resulting dataset are very close to the ones used by Rajan and Subramanian (2008).[130] However, due to data availability, the extended dataset includes a few changes when compared to the original, the main differences being in the measures of institutional quality and ethnic

[130] Table D1.5 in Appendix D1 includes the correlation coefficients between the variables included in the original dataset and the dataset reproduced in this study. With the exception of GDP growth, institutional quality, inflation, and ethnic fractionalization, all the correlation coefficients for the cross-country data are above 0.9. The lower correlation coefficients can be explained by the fact that inflation is transformed by taking the logarithm of (1+inflation/100), and different measures are used for institutional quality and ethnic fractionalization.

fractionalization.[131] In the remainder of this chapter this dataset will be designated "RS08 reproduced".

Following the standard practice in the literature, the average of the annual growth rate of real per capita GDP (Gross Domestic Product) between the start and end year is used as a measure for economic growth.

Despite the fact that some studies, namely Burnside and Dollar (2000), use effective development assistance (EDA) as a measure of development assistance, most authors use official development assistance (ODA). In line with the latter, I use net ODA disbursements expressed as a percentage of GDP to measure development aid. ODA includes all grants or loans that are undertaken by the official sector and are intended to promote economic development and welfare (OECD-DAC, 2016). In the case of loans, the requirement is that they have a grant element of at least 25 per cent. ODA includes not only financial flows, but also technical cooperation. The net value is obtained by deducting from the gross amount the repayments of loan principals or recoveries on grants received during the same period (OECD-DAC, 2016).

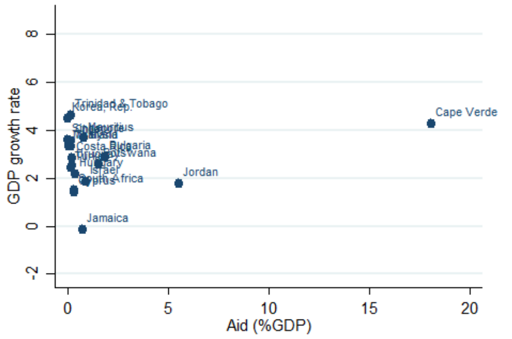
The two indices of state fragility were derived on the basis of the analysis described in Chapter 3, but following the procedure in Chapter 4, in which PCA was applied to each set of variables separately. To recap, the state ineffectiveness index was derived by applying PCA to the set of variables representing state effectiveness and then multiplying the resulting scores by -1, in order to obtain a measure of state ineffectiveness. Similarly, the political violence index results from the application of PCA to the set of variables describing political violence.

The scatters in Figure 19 represent the variables GDP per capita growth and aid for different quartiles of state ineffectiveness and political violence for the 20-year period. Overall, they do not show any clear relationship between growth and aid. Additionally, neither the set of scatters for different quartiles of state ineffectiveness nor the one for different quartiles of political violence suggest that the correlation between the two variables changes depending on the levels of the two dimensions of state fragility. Similar scatters were built for the two 10-year periods and can be found in Appendix D1, Figures D1.1 and D1.2. The conclusions are the same as those described for period 1993-2012.

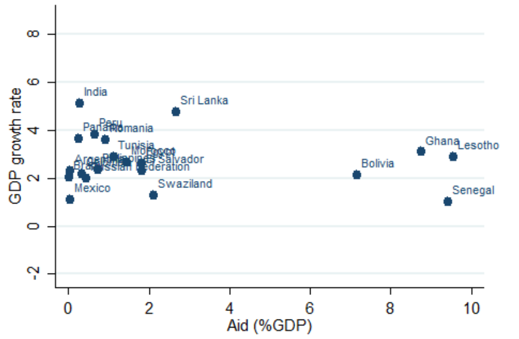
[131] More details of the variables and data sources used by Rajan and Subramanian (2008) are included in Table D1.1 in Appendix D1, which also describes the variables included in the reproduced dataset.

Figure 19. GDP per capita growth rates versus aid for different quartiles of state ineffectiveness and for different quartiles of political violence, 1993-2012

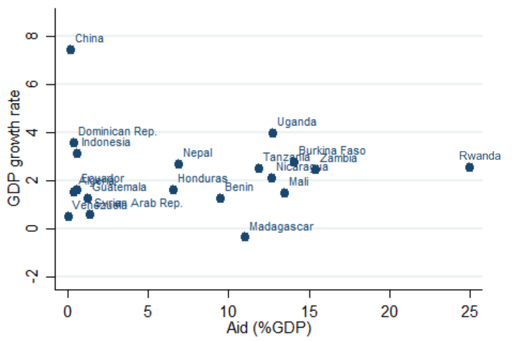
Different quartiles of the state ineffectiveness index



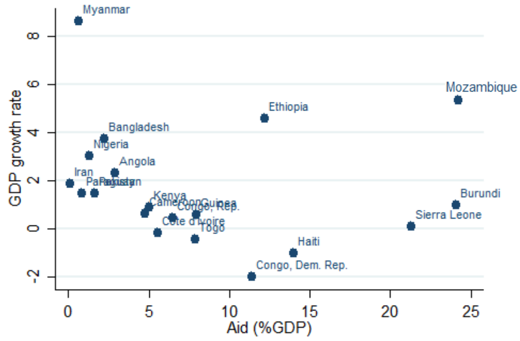
a. SI score below -0.194



b. SI score above -0.194 and below 1.246

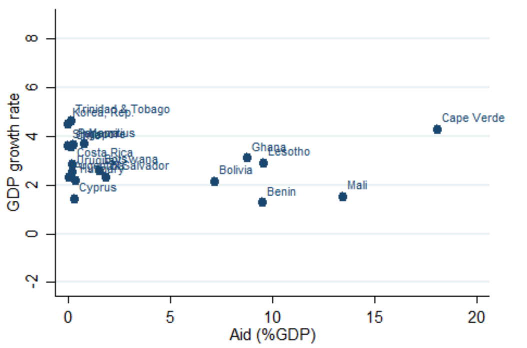


c. SI score above 1.246 and below 1.957

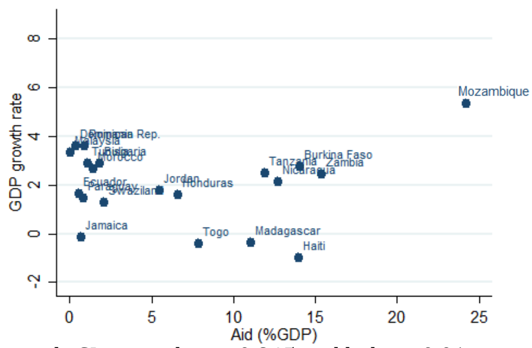


d. SI score above 1.957

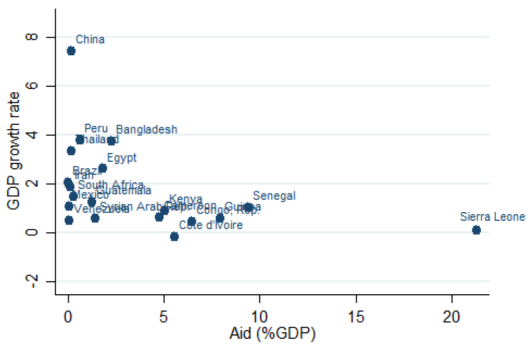
Different quartiles of the political violence index



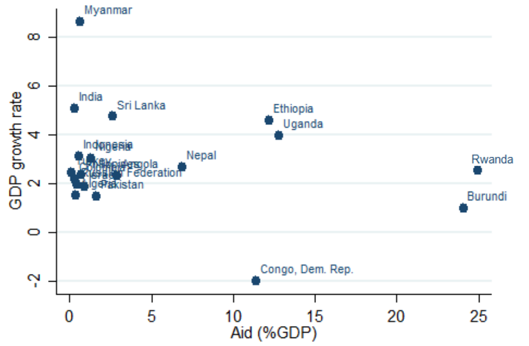
a. SI score below -0.845



b. SI score above -0.845 and below -0.01



c. SI score above -0.01 and below 1.656



d. SI score above 1.656

In line with Rajan and Subramanian's (2008) model, and according to the modifications referred to above, X_i includes the following as controls:

- Initial level of per capita GDP: logarithm of per capita GDP in the beginning of the relevant period in both the cross-country and the panel datasets. This is used to capture convergence, which corresponds to a negative coefficient;
- Trade policy: Sachs and Warner's (1995) openness index in the beginning of the relevant period in the case of cross-country analysis, and averaged across the 5- or 10-year periods in the panel datasets. Based on the assumption that trade openness promotes economic growth, the coefficient is expected to be positive;
- Initial level of life expectancy: life expectancy at birth in the beginning of the relevant period. The coefficient is expected to have a positive sign;
- Measure of geography: time-invariant measure from Bosworth and Collins (2003) that averages the number of frost days and tropical land area. Standard deviates of the two measures are used and then assigned equal weights. Given that the first is positively correlated with growth, whereas the second has a negative correlation, the weights assigned are -0.5 and +0.5, respectively. Given that higher values of this measure, represent better geography, a positive coefficient is expected;
- Indicator of institutional quality: arithmetic average of the ICRG indicator of quality of institutions over the period. A higher level of institutional quality is argued to be positively associated with a higher level of economic growth, and thus the expected sign of the coefficient is positive;
- Inflation: logarithm of (1+inflation/100) in the beginning of the period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. The coefficient is expected to be negative, given that high inflation has a detrimental effect on economic growth;
- Initial level of M2 as a ratio of GDP: money and quasi money (M2) expressed as a percentage of GDP in the beginning of the period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. This is a proxy for the level of depth of the financial system, and, thus, a positive sign is expected;
- Budget balance: cash surplus or deficit (% of GDP) in the beginning of the period in the case of cross-country analysis, and averaged across the 5-year or 10-year periods in the panel datasets. In general, it is more challenging to raise funds to

finance expenditure if the country has a high budget deficit, so a negative coefficient is expected;

- Revolutions: average number of revolutions, defined as “any illegal or forced change in the top government elite, any attempt at such change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government” (Banks and Wilson, 2016). It is expected to have a negative coefficient in the model;
- Ethnic fractionalization: average of Alesina et al.’s (2003) measure of ethnic fractionalization over the period. This indicator reflects the probability that two randomly selected people from a given country will not share the same ethnicity, and it is expected to have a negative correlation with growth.

Rajan and Subramanian (2008) consider different time horizons for the period 1960-2000. Given that the data for the two indices representing state fragility are available only from 1993, the results obtained using Rajan and Subramanian’s (2008) original dataset correspond to the period 1990-2000. For the purpose of comparability, the first set of results compares the coefficients obtained for the period stemming from 1990 to 2000 for the original dataset with the reproduced dataset.

In order to maximise the use of the data available for the fragility indices, and to be consistent with the analysis in the previous chapters, the estimations with the dataset resulting from attempting to reproduce and extend Rajan and Subramanian’s (2008) original dataset are carried out considering the period 1993-2012. The first set of results are obtained with cross-country data for 20- and 10-year horizons; panel data considering 5-year averages and 10-year averages are used later in the analysis.[132] Table 57 summarises the different time periods used, as well as the number of countries included in each sub-sample. Tables D1.6-D1.9 in Appendix D1 provide the descriptive statistics for the variables in each dataset. One observes a sizeable variation of aid flows as a percentage of GDP for the sample of countries considered in all the periods. The average values vary between 3.7% and 5.6%, but the maximum values range between around 19% and 30%. In terms of state ineffectiveness and political violence the values range approximately between -3.7 and 4 in the case of the former, and between -1.7 and 7.6 in the case of the latter.[133]

[132] In the case of panel data, trade policy, inflation, financial quality and budget balance are averages across the relevant periods.
[133] Tables D1.3 and D1.4 in Appendix D1 include the lists of countries for each sub-sample.

Table 57. Different time periods and number of countries

	RS08 dataset	RS08 reproduced					
	Cross-country	Cross-country				Panel	
Time horizon	10-year	10-year	10-year		20-year	5-year	10-year
Sub-period(s)	1990-2000	1990-2000	1993-2002	2003-2012	1993-2012	1993-1997 1998-2002 2003-2007 2008-2012	1993-2002 2003-2012
Nr countries	66	64	77	67	65	63	67

5.4. DIAGNOSTIC ANALYSIS

5.4.1. Multicollinearity

Similarly to the strategy in Chapter 4, I use two procedures to examine the possibility of potential multicollinearity between the explanatory variables included in the analysis in this chapter. The first procedure consists simply in examining the pairwise correlations between the variables, and checking for very high values. The second follows the suggestion in Kennedy (2008: 199) and considers the variance inflation factors VIF_i. These are the diagonal elements of the inverse of the correlation matrix, and can be used to detect multicollinearity. I recall here that the two indicators for this possibility are: i) any VIF_i greater than 10; and ii) the mean value of all the VIF_i considerably greater than 1 (Kennedy, 2008: 199; StataCorp., 2013). The correlation matrices and the tables with the VIFs can be found in Appendix D2. The following paragraphs describe the conclusions derived from them.

The correlation matrix for Rajan and Subramanian's (2008) original dataset with the two indices of fragility (Table D2.1 in Appendix D2) raised no reason for concern. Despite some higher values for the correlations between life expectancy and both aid and state ineffectiveness, none of these coefficients was greater than 0.8 in absolute value, which, as a rule of thumb, is usually considered as an indicator of potential collinearity. The analysis of the VIFs also did not indicate any considerable problems (see Table D2.8 in Appendix D2). None of the values was greater than 10, and the mean VIF is 3.13. Although greater than 1, this does not seem an alarming value.

The same analysis was repeated for the datasets obtained by extending Rajan and Subramanian's (2008) data coverage using, as far as possible, the same data choices. The cross-country data consider three different 10-year periods (1990-2000; 1993-2002; and 2003-2012) and one 20-year period (1993-2012). The correlation matrices for all the variables (not included here for matters of space and simplicity) indicate a high potential of collinearity between state ineffectiveness and the indicator for institutional quality. More specifically, the correlations for the four datasets described were, respectively: -0.9041, -0.9361, -0.9251, and -0.9272. This was already expected given that the indicators used in the construction of the state ineffectiveness index match some of the components that comprise the ICRG. Based on this, unlike Rajan and Subramanian's (2008) work, the analysis in this chapter does not include an indicator of institutional quality in the regressions.

The same procedure was then applied to the remaining variables. The correlation matrices (Tables D2.2-D2.5 in Appendix D2) did not indicate any other potential for collinearity. The highest correlation coefficients obtained correspond to the relationships between life expectancy and the variables GDP per capita, aid, and the dummy for Sub-Saharan African countries. The coefficient for the pair life expectancy-aid is higher than 0.8 in two of the datasets considered. Additionally, with the exception of life expectancy and the initial level of GDP per capita in two of the periods considered, the results of the analysis of the VIFs showed no alarming value (see Table D2.9 in Appendix D2). However, given the importance of including life expectancy as a control in this type of analysis, this variable was still included.

When considering the two panel datasets, one obtained through 5-year averages and the second with 10-year averages, a high correlation between state ineffectiveness and institutional quality was again obtained, with values -0.9069 and -0.9195, respectively. After the latter of these variables was dropped from the analysis, the two procedures proposed here did not highlight any other problematic relationships. The correlation matrices (Tables D2.6 and D2.7 in Appendix D2) showed no coefficient with an absolute value greater than 0.8. Again, the analysis of the VIFs also did not raise the attention to any problematic variables. All the individual VIFs were lower than 10, and the mean VIFs were 2.77 and 2.84 for the 5-year and 10-year averaged datasets, respectively.

Finally, it is important to highlight that, even though a high correlation between the political violence index and the variable revolutions included in the analysis was expected, the results discussed in this section showed no reason for concern. Despite the fact that the correlation coefficients between these variables are high in most datasets, they are frequently below 0.7, and never above 0.8.

5.4.2. Outliers

The second aspect that deserves further examination is whether there is a potential for specific observations to influence the obtained results. The focus is on the main variables of interest, and thus, in addition to state ineffectiveness and political violence, aid is also considered. In line with Chapter 4, I use the Hadi (1992) procedure as implemented in Roodman (2007a) to examine the existence of outliers. The obtained results are represented in Table 58.

Table 58. Outliers identified with the Hadi procedure

	Cross-country				Panel	
	10-year			20-year	5-year	10-year
	1990-2000	1993-2002	2003-2012	1993-2012		
State ineffect.	0	0	0	0	0	0
Political violence	0	0	0	India Israel	0	0
Aid	Nicaragua	Nicaragua	0	Cape Verde	Sierra Leone (93-97)	Rwanda (93-02)

Notes: 0.05 was used as the cut-off significance level for both when applying the Hadi procedure and using the *bacon* command. The latter did not identify any outliers across the different datasets. Periods represented in parenthesis for the results with panel data.

Looking first at the results for state ineffectiveness, no influential observations were detected in any of the datasets considered. In the case of political violence, only when using data averaged for the 20-year period stemming from 1993 until 2012, the observations for India and Israel were identified as potential outliers. Considering the results for aid, the procedure used highlighted potential influential observations in almost all of the datasets used. The observations for Nicaragua were identified when the first decade was considered, and the observation for Cape Verde seems to be an outlier when the 20-year period is used. One observation for Sierra Leone and another for Rwanda were highlighted for panel data.

Also similarly to Chapter 4, I consider the potential outliers among the values for the growth rates by: i) observing the leverage-versus-squared-residual plot[134]; and ii) following the rule of thumb that highlights as influential observations those with leverage higher than 2xK/N, where K is the number of parameters (including the intercept) and N is the sample size, which in the case of the datasets considered is approximately 0.5. The plots are not included here, but Table 59 lists the countries highlighted with this procedure.

[134] This is a graph of leverage against the (normalized) residuals squared and includes two lines showing the average values for these two dimensions. Any points lying above the horizontal line have a leverage value which is higher than average, and any points lying to the right of the vertical line have residuals which are higher than average (StataCorp., 2013). The first of these groups of points causes the most concern.

Table 59. Outliers identified for economic growth

	Cross-country				Panel	
	10-year			20-year	5-year	10-year
	1990-2000	1993-2002	2003-2012	1993-2012		
Economic growth	Nicaragua	Angola	India	Congo, D.R. Cyprus	Brazil (93-97)	Angola (93-02)

Notes: These countries were selected based on the observation of the leverage-versus-squared-residual plot and by considering levels of the leverage higher than 0.5.

In what follows, the analysis will be made considering all the available observations in order to maximise the data used. However, in section 5.5.3 I revisit the results and compare them with those obtained after the exclusion of outliers.

5.4.3. Endogeneity

In Chapter 4, I considered the possibility that state ineffectiveness and political violence were endogenous to the model, and used a selection of different strategies to take this into account. In this chapter, however, I will assume that they are exogenous.[135] Still, as cautioned by the aid-growth literature, the potential endogeneity of the aid variable warrants consideration in the discussion of its impact on growth. The following paragraphs discuss this issue in more detail.

a) Endogeneity of aid

One of the hardest problems to tackle in aid-growth regressions is the issue of endogeneity. The endogeneity problem can be a result of an omitted variable, which results from not accounting for the effect of a third variable that may affect aid and growth (Roodman, 2007b).

Second, the possibility of endogenous causation can stem from reverse causality, i.e. it is not unlikely that aid levels are affected by economic growth (Roodman, 2007b). From a different perspective, if the correlation between aid and growth is negative in the allocation equation (as lower levels of growth are associated with higher inflows of aid), but positive in the impact equation (as an increase in aid inflows is associated with higher growth rates), then this leads to identification problems (Rajan and Subramanian, 2008; Adamu, 2013). Dalgaard, Hansen and Tarp (2004) argue that this would be a

[135] This choice is supported by the fact that the results obtained in Chapter 4 after taking into account the potential endogeneity of these variables were not very different from the baseline results.

relatively inconsequential problem if one considered that aid allocations are based on past income levels, which are not necessarily good predictors of future growth in poor countries. However, with the transformation of a stylised system of equations for growth and aid into a time-averaged system, the latter becomes dependent on the average rate of growth - as long as the dependency is within the period over which the system is averaged (Dalgaard, Hansen and Tarp, 2004). Also, they add, it is difficult to test for endogeneity given that all time varying regressors are possibly correlated with the time-aggregation error term.

b) Proposals to tackle endogeneity

Endogeneity is frequently addressed by applying an appropriate instrumentation strategy, i.e. finding sources of exogenous variation that are uncorrelated with other possible determinants of income levels. For the case of the aid-growth link, this means finding a variable that is supposedly correlated with growth only through its relationship with aid. If this correlation exists, then aid must have worked (Roodman, 2007b: 8). In the following paragraphs I distinguish between the studies making use of internal instruments from those employing alternative external instruments.[136]

Internal instruments

The use of internal instruments, based on the transformation of variables, is common in the literature. For instance, lagged policy is used in different studies, such as Hansen and Tarp (2001) or Clemens, Radelet and Bhavnani (2004a). However, it has been criticised for being based on the assumption that a policy shock (e.g. trade reform) in a certain period has a contemporaneous effect on growth, but does not affect it in the next period except through aid (Rajan and Subramanian, 2008: 648).

In some cases, the authors use lagged aid as an instrument (e.g. Clemens et al., 2012). If one assumes that past aid inflows i) are a good predictor of current aid allocation, given that they are more or less persistent over time, ii) cannot be affected by current growth,

[136] A recent group of studies have proposed to use time series analysis to assess the link between aid and growth. Given the scope of the analysis, these are not discussed at length here, but reference is made to Herzer and Morrissey (2013), Juselius, Moller and Tarp (2013), and to the dialogue between Nowak-Lehmann et al. (2012) and Herzer et al. (2015) with Lof, Mekasha and Tarp (2015a, b). Other approaches include the use of sample splitting methods (e.g. Kourtellos, Tan and Zhang, 2007; Kalyvitis, Stengos and Vlachaki, 2012), and of nonlinear panel thresholds (Alia and Anago, 2014).

and iii) do not affect growth in the current period, then they may be a good candidate for an instrument. However, it would be highly collinear with aid itself (Werker, Ahmed and Cohen, 2009: 225). Rajan and Subramanian (2008: 647-648) highlight that even if predetermined (i.e. influenced by random events in past growth rates but not by contemporaneous events), these variables may not be exogenous, especially if there is serial correlation in the dependent variable, which is likely when growth is measured over a rather short interval.

Promising to overcome some of the problems of using OLS and 2SLS to estimate dynamic models[137], GMM estimators, and especially the system GMM estimator, became popular in aid effectiveness studies[138]. The system GMM uses a system of equations that combines a regression in differences (using lagged values as instruments) and a regression in levels (using the additional instruments). Hansen and Tarp (2001) were the first to use this approach to estimate the impact of aid on growth, and the recent influential paper by Rajan and Subramanian (2008) also applies it. Other recent studies using GMM include Angeles and Neanidis (2009), Minoiu and Reddy (2010), Gyimah-Brempong, Racine and Gyapong (2012), and Dreher and Langlotz (2016).

However, similarly to the aforementioned instrumentation strategies, this has also been questioned. First, the problems resulting from weak instruments, namely the fact that they bias coefficient estimates, also applies to panel GMM (Arndt, Jones and Tarp, 2010: 3). Clemens et al. (2012: 597)[139] and Bazzi and Clemens (2013: 175) found that the instrumentation by both lagged levels and lagged differences of Rajan and Subramanian's (2008) regressors is very weak. Frot and Perrotta (2012: 6) warn that the relevance of the instruments used within this procedure is never tested through the standard diagnostic methods to determine their strength, and highlight the problems for inference when using many weak instruments.

Second, there are concerns about the assumption that both country fixed effects and omitted variables are orthogonal to the lagged differences of the right-hand side variables used as instruments for the level equation, which is an essential condition for

[137] The use of dynamic models, which include lagged values of the dependent variable as regressors, allows one to model the process of economic growth more accurately. However, these are correlated with the fixed effect in the error term, which renders the OLS and 2SLS inconsistent (Frot and Perrotta, 2012: 6).

[138] See Arndt, Jones and Tarp (2009: 4) and Frot and Perrotta (2012: 6) for the advantages of applying these methods.

[139] These authors provide a close examination of four of the most influential studies in the literature, namely, Boone (1996), Burnside and Dollar (2000), Hansen and Tarp (2001), and Rajan and Subramanian (2008).

the validity of the system GMM estimator (Arndt, Jones and Tarp, 2010: 3-4). Third, there is the possibility that internal instruments appear valid according to the Hansen-Sargan tests, even if they are invalid, as a result of instrument proliferation (Roodman, 2009). Lastly, the use of internal instruments is not sufficient to circumvent the bias stemming from systematic measurement error in the endogenous regressors (Arndt, Jones and Tarp, 2010: 4).

External instruments

One way of overcoming the problems discussed in the previous paragraphs is the use of external instruments. Rajan and Subramanian (2008) propose an instrument based on the supply of aid based on donor-related characteristics, namely history, captured through colonial links and commonality of language, and influence, captured by considering the relative size of donor and recipient, and its interaction with colonial links. Yet, given the high correlation of this instrument with population size[140], their instrumentation strategy has been criticised, along with other studies using this approach, namely the prominent work by Boone (1996) and Burnside and Dollar (2000) (Bazzi and Clemens, 2013: 161).

Deaton (2010: 434) argues that, despite determining aid, neither population, country-specific dummies (such as a dummy for Egypt) nor colonial legacy variables (for example, a dummy for francophone countries)[141] can be plausibly assumed to be exogenous, given that it is not reasonable to assume that either of these variables has any effect on growth other than through the effects on aid flows, which is a necessary condition for exogeneity. For instance, population size may have a direct effect on growth through other mechanisms, such as the extent of internal and external trade, the basket of goods exported by a country, or even the degree of political integration with neighbours (Clemens et al., 2012: 596-597; Bazzi and Clemens, 2013: 160). Frot and Perrotta (2012: 4) apply an analogous criticism to the fraction of land in the tropics, used by Dalgaard, Hansen and Tarp (2004), maintaining that this variable is correlated with

[140] Bazzi and Clemens (2013: 158) demonstrate that all the instrumentation power rests on the population instrument.
[141] The rationale for the use of population, a dummy for Egypt, or a dummy for francophone countries is as follows, as explained in Deaton (2010: 434). Given that the allocation of aid is made on a country basis, it is assumed that larger countries receive less aid per capita. A great part of American aid is disbursed to Egypt as part of the Camp David accords, in which it agreed to a partial reconcilement with Israel. Finally, due to their French colonial legacy, francophone countries receive additional aid from France.

institutions which, in turn, affect long-run development, as demonstrated in other studies (e.g. Acemoglu, Johnson, and Robinson, 2001).[142]

A series of validity checks run by Arndt, Jones and Tarp (2010: 9) concur with Bazzi and Clemens' (2013) concerns over the population ratio as the driving force behind the fitted aid instrument, and suggest that the validity of the exclusion restriction in terms of the population-based instruments is a fundamental issue. Building upon Rajan and Subramanian's (2008) specification, Arndt, Jones and Tarp (2010) propose a number of changes to their specification, given their concerns regarding the instrument used. First, the estimates are re-calculated considering missing values for bilateral aid indicators as zero, based on the claim that in most cases missing values in the OECD-DAC aid dataset represent unreported null values. Second, aid per capita is used as the dependent variable instead of aid/GDP, given that there is a chance that GDP is correlated with some of the variables included in the right-hand side independently of aid, which may lead to misinterpretation (or bias) in least squares regressions. Third, the coloniser-specific variables (and interactions) are dropped, and replaced by a single dummy for whether the country was ever a colony, because there are enough reasons to believe that these are not orthogonal to growth and should therefore be left out of the preliminary regression used to find the aid instrument. Finally, donor-specific fixed effects are included in order to account for the fact that there are different factors leading to donors' attitudes to giving foreign aid. The authors apply a counterfactual model framework and use doubly robust estimators for evaluating aid's impact, alongside the new obtained instrument.[143]

Lessmann and Markwardt (2012) lend support to Rajan and Subramanian's (2008) strategy by proposing a similar set of instruments. After including the instruments used in Burnside and Dollar (2000) and Hansen and Tarp (2001) – i.e. Franc zone dummy, Central America dummy, log of population, arms imports as a share of total import, and lagged aid – combined with variables reflecting colonial relationships – namely the distance from equator, the share of population speaking a primary European language, a dummy for countries with a federal constitution and the country size, and the interaction between the last two variables – they conclude that standard instruments used in the literature are relatively poor predictors of aid, whereas they validate the

[142] Werker, Ahmed and Cohen (2009: 226) add that the use of time-invariant variables, such as Egypt dummy, Africa Franc zone dummy, or population, limits the temporal analysis that can be done.

[143] I refer to Arndt, Jones and Tarp (2010) for more details about the specification proposed as well as the estimators employed.

newly introduced instruments (Lessmann and Markwardt, 2012: 1729-1731).[144] However, in addition to the concerns discussed in the previous paragraphs, doubts have also been raised about their assumption that historical variables are exogenous, given that it has been demonstrated that they are correlated with traditional growth determinants (Frot and Perrotta, 2012: 5).[145]

In a similar vein, Angeles and Neanidis (2009) use one lag of the endogenous variables in their model along with the exogenous variables used as instruments in Hansen and Tarp (2001), Burnside and Dollar (2000), Clemens, Radelet and Bhavnani (2004a) and Tavares (2003). In addition, they include indicators of the recipient countries' geographical and cultural proximity to the OECD-DAC member countries (namely, the inverse of bilateral distance, and three dummies for common land border, common official language, and common majority religion) interacted with the latter's aid outflows. In line with the criticism described above, the exogeneity of this instrument has also been questioned given that it is based on the premise that geographical distance between recipient nations and donor countries only affects growth through foreign aid. It has been argued that geographical distance between countries influences, for instance, trade patterns as well as flows of people, which are both determinants of growth (Dalgaard and Hansen, 2010: 37). Additionally, they use arms imports (as a share of total imports) lagged one period, implying that this variable may affect growth in the current period, but not in the following period except through aid, which does not seem plausible (Frot and Perrotta, 2012: 5).

On their study of the aid-growth relationship at the firm level, Chauvet and Ehrhart (2015) follow a similar line of reasoning based on the 'supply-side' determinants of aid. The authors propose to instrument aid using the total amount of fiscal revenue (as a share of donors' GDP), in order to capture changes in donors' economic environment, weighted by historic proximity between donors and receiving countries. The latter is represented by a dummy for whether the recipient country is a former colony of the donor country.

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[144] See Dreher, Eichenauer and Gehring (2014: 3-4) for a list of studies using instruments that proxy for the geopolitical importance of recipient countries to donors. Still, Headey (2008) questions this strategy. The results obtained by the author suggest that geopolitical aid may be less effective than development aid, which means that the use of geopolitical factors as instruments could potentially lead to an underestimation of the effect of aid on growth. Dreher, Eichenauer and Gehring (2014) contribute to this argument by showing that geopolitical aid is less effective than other aid, and consequently that estimates of the effect of politically motivated aid only represent the lower bound of the true effect of overall aid.

[145] These instruments are also undermined by their limited variation since historical variables are simple dummies or have fixed values over time (Frot and Perrotta, 2012: 5).

In line with this proposal, Temple and Van Sijpe (2015) propose another instrument based on the supply of aid, in the form of a weighted average of donor budgets. This relies on the assumption that individual, time varying conditions of particular countries do not significantly affect the total aid budgets of the majority of donors. In a general case of N_D donors, the synthetic predictor of aid is $A_{it}^{S}/Y_{it} \equiv \left(\sum_{d=1}^{N_D} a_{i0}^{d} D_{dt}\right)/Y_{it}$, where a_{i0}^{d} is the share of donor d's total aid disbursements that recipient i receives, calculated over an initial period that is excluded from the estimation, and D_{dt} is the total aid disbursement made by donor d in period t (Temple and Van Sijpe, 2015: 7).

Also focusing on the supply side of aid, Frot and Perrotta (2012) build upon the fact that donor-recipient partnerships formed earlier are associated with higher aid levels. The authors argue that this instrument is exogenous to growth, as they found no evidence of a relationship between the date of creation of a partnership and growth rates, and show that it is highly correlated with actual aid levels (Frot and Perrotta, 2012). Dreher and Langlotz (2016) use the interaction of government fractionalization in the donor country with a country's probability of receiving aid as the instrument for aid[146]. The rationale for this choice is rooted in the insights from two strands of literature. The first indicates that government's expenditures are augmented by legislature fragmentation, and the second that government budgets increase aid disbursements to recipient countries (Dreher and Langlotz, 2016: 5-6).

On a different approach, Bruckner (2013) proposes a two-step procedure that first discounts the effect of growth on aid, and then uses the obtained residual variation in foreign aid that is not driven by GDP per capita growth as an instrument to determine the inverse effect. Given the use of a panel of 47 least developed countries covering the period 1960-2000, the author argues that rainfall and international commodity price shocks are suitable instruments to estimate the response of foreign aid to economic growth. A panel fixed-effects estimator is then applied to determine the effect running from aid to growth. Focusing on the aid-growth relationship at the regional level, Dreher and Lohmann (2015) build upon Bruckner's (2013) approach, and propose to instrument for aid by interacting a variable that indicates whether or not a country crossed the IDA's income threshold with a recipient region's probability of receiving aid.

[146] The latter is proxied by the percentage of years the country received aid from a particular donor over the sample period, in line with Nunn and Qian (2014). This paper examines the causal effect of US food aid on conflict. The instrument used results from the interaction between last year's US wheat production and the proportion of years that a country receives a positive amount of US food aid during the period considered in the study.

Following a similar two-step procedure, Jackson (2014) focuses instead on the effects of natural disasters on aid inflows. Defining as "aid neighbours" countries sharing common donors, the author examines the impact of natural disasters on foreign aid on both the countries exposed to disaster shocks and the aid neighbour countries. After analysing this effect, drought exposure to recipients' aid neighbours is used as an instrument for own aid inflows.

A different group of authors have drawn upon the insights derived from the methods using natural experiments and have applied them to purge endogeneity concerns in aid-growth cross-country regressions. The idea is to focus on a specific episode of foreign aid and use a natural experiment approach to find the instrument. Werker, Ahmed and Cohen (2009) note that, following the oil crises of 1973 and 1979, Gulf oil exporters distributed generous amounts of foreign aid to the developing world, greatly favouring Muslim countries. The authors then suggest the use of this windfall in unconditional foreign aid coincident with the rise in the price of oil as an instrument for the short-run impact of aid on the economy, by interacting the price of oil with whether the recipient country is Muslim. They find little measurable effect of this untied windfall of aid on growth. Galiani et al. (2014) contribute to the literature by proposing an instrument that considers the IDA income threshold level[147]. Based on the authors' observation that total aid decreases significantly once a recipient country crosses the IDA income threshold from below, and that this threshold is not necessarily linked with any structural change in economic growth, it is argued that it can serve as a plausible instrument to assess the aid-growth relationship.[148]

[147] The income threshold criterion is used for eligibility purposes. Once the country reaches an income level higher than the threshold, and remains over this level for a period of three consecutive years, lending volumes are usually reduced. Since this "graduation" from IDA is recognized as a signal that the recipient country is in less need for aid, it is also accompanied by a decrease in aid flows from other donors (Galiani et al., 2014: 9).

[148] Notwithstanding these improvements, the distrust in the use of instruments is kept by some authors. In Roodman (2008), the author provides evidence for the scepticism of the results found in the aid effectiveness literature, discussing autocorrelation, instrument proliferation and multicollinearity as common specification problems that undermine the use of instruments to tackle endogeneity. Using non-instrumental techniques, the author demonstrates that the aid growth-relationship is negative and runs from growth to aid. See Leon-Gonzalez and Montolio (2015) for an alternative approach that applies Bayesian model averaging to allow for uncertainty in the set of regressors, in the exogeneity restrictions, and in the choice of instruments commonly employed with panel data in growth regressions with fixed effects.

c) Addressing endogeneity

Bearing in mind the possibilities advanced in the literature reviewed above, in this chapter, first, I follow the proposal in Rajan and Subramanian (2008) and apply their instrument in a 2SLS procedure. As mentioned before, Rajan and Subramanian's (2008) proposal consists of a zero-stage estimation of aid based on a model of the supply of aid obtained by estimating the following equation:

$$a_{dit}/y_{it} = \delta_0 + \delta' Z_{dit} + v_{dit}, \tag{6}$$

where Z_{dit} includes donor-related characteristics, namely, commonality of language, whether they are in a current colonial relationship, a dummy for pairs of countries which had a colonial relationship at some point, dummies for countries which have been a colony of the United Kingdom (UK), France, Spain, or Portugal, the ratio of the logarithm of the populations of donor and recipient, and the interactions between these variables and each of the colonial dummies. The second stage consists in the aggregation of the estimated results by recipient country, in order to obtain the level of fitted aid per capita for the given period.

As highlighted before, this approach has been the subject of criticism in subsequent studies. One of the main concerns raised by Bazzi and Clemens (2013), and confirmed by Arndt, Jones and Tarp (2010), was that this instrumentation strategy is mainly reliant on the population variable, which, it is argued, may have a direct effect on growth through other mechanisms, such as the extent of internal and external trade (Clemens et al., 2012; Bazzi and Clemens, 2013). Thus, in section 5.5.3, I use some alternative procedures to check the robustness of the results obtained with Rajan and Subramanian's (2008) instrument. More specifically, I first employ the alternative instrumentation procedure proposed by Arndt, Jones and Tarp (2010). Second, I use the external instruments suggested by Lessmann and Markwardt (2012). More detail about these approaches will be provided later.

5.5. RESULTS ANALYSIS

The results derived from estimating the specifications described in section 5.3 are discussed at length in the following paragraphs. The analysis is split into cross-country evidence, in subsection 5.5.1, and panel evidence, in subsection 5.5.2. Within each subsection, there is a subdivision according to the period of analysis and the method of estimation. The hypotheses tested, and respective coefficients of interest, as well as the variables included, and the time periods and horizons considered in each table are summarised in Table 60.[149]

Table 60. Summary of the tables with the main results

	Baseline						Robustness checks															
							Outliers				Aid categories								Endogeneity			
OLS	**63**		**64**		**69**		**74**		**75**		**76**		**77**		**78**		**79**					
IV	**65**		**66**		**72**														**80**		**81**	
Hypothesis, equation, coeff.																						
H1.1 and H1.2, (4), β_6 and β_7	X		X		X		X		X		X		X		X		X		X		X	
H2, (5), β_8		X		X		X		X		X		X		X		X		X		X		X
Variables																						
Aid	X	X	X	X	X	X	X	X	X	X									X	X	X	X
Bilateral/Multilateral aid											X	X	X	X								
Early/Late/Human. aid															X	X	X	X				
Aid x SII*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aid x PVI*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aid x SII x PVI*		X		X		X		X		X		X		X		X		X		X		X
Cross-country																						
10-year: 1990-00	X	X																				
20-year: 1993-12			X	X			X	X			X	X			X	X			X	X		
10-year: 1993-02/2003-02			X	X			X	X			X	X			X	X			X	X		
Panel																						
5-year					X	X			X	X			X	X			X	X			X	X
10-year					X	X			X	X			X	X			X	X			X	X

Notes: Aid* corresponds to Aid, Bilateral aid, Multilateral Aid, Early-impact aid, Late-impact aid, or Humanitarian aid depending on the specification considered.

Section 5.5.1 starts by reporting the OLS results for period 1990-2000, comparing with those obtained by Rajan and Subramanian (2008), and then for the full period 1993-2012. The second part of this section describes the coefficients obtained with IV methods. A similar structure is then used in section 5.5.2 to describe the estimated coefficients obtained after employing pooled OLS, FE methods and IV methods to estimate all the hypotheses using panel data, with 5-year averages and 10-year averages.

In each table, the first set of results corresponds to estimating equation (4), i.e. before including any interaction terms. The second set of results adds the interaction between aid and each of the indices of state ineffectiveness and political violence, and, finally, the third set of results corresponds to the coefficients obtained after including the triple interaction to the analysis.

The last part of this section (5.5.3) discusses the conclusions drawn from a set of robustness checks. More specifically, I consider the changes observed after excluding

[149] I refer back to Table 56 for a summary of the hypotheses and coefficients of interest.

potential outliers, using different aid categories, and considering different approaches to overcome the endogeneity of aid.

5.5.1. Cross-country evidence

a) OLS estimates

The results in the following tables were obtained using simple OLS methods, and thus overlooking the potential endogeneity of aid for the moment. Columns (1)-(3) in Table 61 correspond to the estimated coefficients for Rajan and Subramanian's (2008) original dataset (after adding the two fragility indices) for the period 1990-2000, whereas columns (4)-(6) report the coefficients obtained with the reconstructed dataset for the same period.

Columns (1) and (4) were included to allow for the observation of any changes in the coefficient for aid when the interaction terms are included. Columns (2) and (5) represent the estimation of equation (5), thus testing *H1.1* and *H1.2*, whereas columns (3) and (6) report the results from estimating equation (6), and hence testing *H2*.

Starting with the coefficients obtained for Rajan and Subramanian's (2008) dataset, the signs for the control variables are generally in line with those obtained by these authors (with the exception of institutional quality), though the significance level has been reduced in some of them, namely, life expectancy and inflation. Focusing on the coefficients of interest, before the interaction terms between aid and the fragility variables are included, one finds a negative and significant effect of aid on growth, in contrast with the non-significant effect reported by Rajan and Subramanian (2008). However, when the two interaction terms between this variable and state ineffectiveness and political violence are added to the specification (column (2)), there is a reduction in the value and significance level of aid. Still, despite being negative, none of the coefficients for the interaction terms is significant. The inclusion of the triple interaction does not lead to massive changes in the significance levels of the other variables, and the lack of significance of this term does not suggest that there is any interactive effect of state ineffectiveness and political violence on the impact of aid on economic growth.

Table 61. Cross-country OLS estimations, 1990-2000

	Dependent variable: real GDP per capita growth					
	RS08 original 1990-2000			RS08 reproduced 1990-2000		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(initial pc GDP)	-1.661***	-1.519***	-1.408**	-1.494***	-1.361***	-1.331***
	(0.519)	(0.552)	(0.547)	(0.461)	(0.457)	(0.463)
Initial policy	-0.368	-0.393	-0.358	-0.0774	-0.262	-0.108
	(0.481)	(0.492)	(0.476)	(0.567)	(0.573)	(0.578)
Initial life expectancy	0.0890	0.0833	0.0780	0.123	0.109	0.108
	(0.0562)	(0.0566)	(0.0577)	(0.0734)	(0.0719)	(0.0735)
Geography	0.732*	0.696*	0.716*	0.141	0.0711	0.119
	(0.389)	(0.401)	(0.395)	(0.323)	(0.328)	(0.331)
ICRG	-0.778	-0.855	-0.621			
	(2.803)	(3.017)	(2.918)			
Inflation	0.000472	0.000393	0.000341	-0.289	-0.311	-0.272
	(0.000497)	(0.000526)	(0.000564)	(0.340)	(0.337)	(0.336)
Initial M2/GDP	-0.0131	-0.0139	-0.0125	-0.0320**	-0.0354**	-0.0323**
	(0.0129)	(0.0137)	(0.0134)	(0.0139)	(0.0151)	(0.0154)
Initial budget balance	0.230***	0.224***	0.220***	0.175**	0.160*	0.166*
	(0.0602)	(0.0631)	(0.0614)	(0.0867)	(0.0892)	(0.0883)
Revolutions	-1.629*	-1.621*	-1.494	-2.696*	-2.721*	-2.661
	(0.885)	(0.916)	(0.921)	(1.447)	(1.543)	(1.593)
Ethnic fractionalization	0.796	0.520	0.254	0.0372	-0.384	-0.443
	(0.939)	(1.031)	(1.001)	(1.232)	(1.212)	(1.150)
Sub-Saharan Africa	-0.306	-0.212	-0.0545	-1.701**	-1.704**	-1.598**
	(0.944)	(0.968)	(0.966)	(0.665)	(0.649)	(0.697)
East Asia	1.548**	1.597**	1.563**	1.828*	2.120**	1.954*
	(0.768)	(0.779)	(0.752)	(0.951)	(1.038)	(1.066)
Aid/GDP	-0.0910*	-0.0590	-0.0469	0.0403	0.102	0.0977
	(0.0539)	(0.0806)	(0.0855)	(0.0522)	(0.0789)	(0.0790)
State ineffectiveness	-0.689***	-0.649**	-0.628**	-0.679***	-0.583***	-0.571***
	(0.217)	(0.249)	(0.249)	(0.202)	(0.200)	(0.204)
Political violence	0.401**	0.444**	0.389*	0.497**	0.442*	0.406*
	(0.157)	(0.193)	(0.195)	(0.227)	(0.227)	(0.241)
SI x PV	0.00428	0.0532	0.122	-0.0823	-0.0596	-0.0180
	(0.0673)	(0.102)	(0.122)	(0.0759)	(0.0920)	(0.111)
Aid x State ineffectiveness		-0.0182	-0.00789		-0.0485	-0.0334
		(0.0464)	(0.0481)		(0.0440)	(0.0423)
Aid x Political violence		-0.00869	0.0462		0.0178	0.0529
		(0.0359)	(0.0409)		(0.0285)	(0.0494)
Aid x SI x PV			-0.0262			-0.0166
			(0.0180)			(0.0195)
Constant	11.31**	10.57**	9.754*	8.806**	8.864**	8.431**
	(4.507)	(4.783)	(4.892)	(4.167)	(4.306)	(4.144)
Observations	66	66	66	64	64	64
R^2	0.647	0.650	0.661	0.651	0.662	0.668
Adj. R^2	0.532	0.516	0.521	0.542	0.537	0.536

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Considering now the coefficients obtained for the reproduced dataset for period 1990-2000, one notices some changes in the significance level of the controls. The results show a positive but non-significant coefficient for aid, both before and after including the interactions between this variable and the two indices of state fragility. None of the interaction terms with aid shows a significant effect, and their magnitudes are also fairly low.

When the main period of analysis is considered (Table 62), the first noticeable change is a general reduction in the significance level of the control variables included. Despite the drop in the explanatory power of the model, it remains relatively high, which indicates that the model is not capable of distinguishing the effects of the different variables. The results are presented in a similar order to that in Table 61, but consider now one 20-year period in columns (1)-(3), and two 10-year periods, 1993-2002 in columns (4)-(6) and 2003-2012 in columns (7)-(9).

Table 62. Cross-country OLS estimations, 1993-2012

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(in. pc GDP)	-1.242***	-1.141***	-1.127***	-1.339***	-1.172***	-1.136***	-0.722	-0.712	-0.516
	(0.363)	(0.333)	(0.337)	(0.376)	(0.401)	(0.342)	(0.566)	(0.557)	(0.580)
Initial policy	-0.186	-0.434	-0.324	0.643	0.502	0.710	0.221	0.0713	0.109
	(0.503)	(0.475)	(0.495)	(0.505)	(0.513)	(0.539)	(0.618)	(0.658)	(0.669)
Initial life exp.	-0.0282	-0.0487	-0.000824	-0.0470	-0.0617	-0.0314	-0.00904	-0.0146	0.00477
	(0.0482)	(0.0341)	(0.0490)	(0.0663)	(0.0655)	(0.0537)	(0.0564)	(0.0558)	(0.0558)
Geography	0.155	0.0912	0.0968	0.244	0.159	0.217	-0.138	-0.154	-0.157
	(0.237)	(0.241)	(0.237)	(0.262)	(0.276)	(0.267)	(0.283)	(0.281)	(0.287)
Inflation	-0.410	-0.270	-0.00146	-0.0813	-0.214	-0.154	12.88***	11.70***	10.84**
	(0.507)	(0.382)	(0.350)	(0.346)	(0.323)	(0.324)	(3.880)	(4.244)	(4.208)
Initial M2/GDP	-0.00652	-0.00674	-0.00624	0.00471	0.00494	0.0113	-0.0163*	-0.0177**	-0.0184**
	(0.00656)	(0.00562)	(0.00615)	(0.0137)	(0.0141)	(0.0147)	(0.00831)	(0.00761)	(0.00792)
Initial budget bal.	0.0173	-0.00599	0.00178	0.0980	0.0677	0.0630	0.0811	0.0770	0.0875*
	(0.0593)	(0.0554)	(0.0524)	(0.0605)	(0.0648)	(0.0584)	(0.0504)	(0.0510)	(0.0518)
Revolutions	-0.478	-0.0823	-0.0398	-0.992	-0.861	-0.498	-0.630	-0.584	-0.580
	(0.689)	(0.690)	(0.718)	(0.734)	(0.754)	(0.757)	(0.557)	(0.572)	(0.535)
Ethnic fract.	-0.0286	-0.301	-0.317	-0.0438	-0.492	-0.869	-1.111	-0.671	-0.920
	(0.782)	(0.781)	(0.799)	(0.912)	(0.914)	(0.937)	(1.103)	(1.104)	(1.162)
Sub-Saharan Afr.	-1.240*	-1.470**	-0.955	-1.137	-1.189	-0.689	-0.699	-0.951	-0.503
	(0.655)	(0.567)	(0.679)	(0.777)	(0.783)	(0.718)	(1.222)	(1.232)	(1.251)
East Asia	1.706**	1.811***	1.722**	0.985	1.128	0.857	1.879***	1.863***	1.801***
	(0.682)	(0.662)	(0.668)	(1.038)	(1.084)	(1.098)	(0.648)	(0.500)	(0.525)
Aid/GDP	-0.0792	0.0199	0.0799	-0.132**	-0.0574	-0.0266	0.0195	0.115	0.167**
	(0.0703)	(0.0377)	(0.0648)	(0.0639)	(0.0803)	(0.0831)	(0.0855)	(0.0699)	(0.0813)
State ineff.	-0.618***	-0.532***	-0.451***	-0.539***	-0.475**	-0.379*	-0.629***	-0.569***	-0.503**
	(0.160)	(0.148)	(0.144)	(0.200)	(0.202)	(0.212)	(0.194)	(0.186)	(0.206)
Political violence	0.108	0.0513	0.0553	0.141	0.110	0.0217	0.454**	0.420**	0.410**
	(0.153)	(0.144)	(0.151)	(0.149)	(0.139)	(0.145)	(0.181)	(0.183)	(0.184)
SI x PV	0.0610	0.0875	0.140**	-0.0262	0.0125	0.126	0.0452	0.0718	0.110*
	(0.0823)	(0.0681)	(0.0660)	(0.0774)	(0.0720)	(0.0767)	(0.0682)	(0.0579)	(0.0593)
Aid x SI		-0.0592***	-0.0640***		-0.0406	-0.0214		-0.0658*	-0.0694**
		(0.0213)	(0.0228)		(0.0353)	(0.0435)		(0.0333)	(0.0334)
Aid x PV		-0.0135	0.0351		-0.00177	0.0904**		0.0146	0.0744
		(0.0207)	(0.0326)		(0.0225)	(0.0393)		(0.0333)	(0.0460)
Aid x SI x PV			-0.0244			-0.0442**			-0.0198*
			(0.0158)			(0.0188)			(0.00995)
Constant	16.16***	16.71***	12.98***	16.86***	16.50***	13.57***	10.41*	10.74**	7.634
	(4.576)	(2.820)	(3.608)	(4.882)	(4.895)	(4.465)	(5.229)	(4.822)	(5.413)
Observations	77	77	77	67	67	67	65	65	65
R^2	0.459	0.553	0.572	0.523	0.537	0.580	0.498	0.545	0.568
Adj. R^2	0.326	0.424	0.439	0.383	0.376	0.422	0.344	0.380	0.399

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The results obtained before the interaction terms were included show a negative coefficient for aid for periods 1993-2012 and 1993-2002, but significant only for the latter, and a positive and non-significant effect for the decade 2003-2012. The changes in this coefficient after the inclusion of the terms aid x state ineffectiveness and aid x political violence vary depending on the period considered. When the 20-year horizon is used, there is a change in the sign for the aid term, and one obtains a small, but negative and significant effect of state ineffectiveness on the impact of aid. The coefficient for the second interaction term is also negative, but suggests no significant effect. With the dataset for period 1993-2002, one observes a loss of significance for the aid variable, but the coefficients for the interaction terms do not suggest any significant effect of either state ineffectiveness or political violence on aid effectiveness. Finally, when the last decade of the period is considered, the inclusion of the interaction terms leads to an increase in the magnitude of the coefficient for aid, which remains non-significant, but again one finds an indication of a negative, despite small, effect of state ineffectiveness on the impact of aid, and no effect for the interaction between aid and political violence.

Observing now the results represented in columns (3), (6), and (9), one notices that, with the exception of period 1993-2002, the inclusion of the triple interaction term does not lead to major changes in the coefficients for the other interaction terms. Additionally, the coefficient shows a small, but negative and significant interactive effect of state ineffectiveness and political violence on the impact of aid on economic growth in both 10-year periods used.[150]

b) IV estimates

Table 63 portrays the estimated coefficients resulting from the application of Rajan and Subramanian's (2008) instrumentation procedure (detailed in section 5.4.2). Following the same structure of Table 61, columns (1)-(3) correspond to the original dataset with the addition of the two fragility indices, whereas columns (4)-(6) show the results obtained for the reproduced dataset for the same period (1990-2000).

Starting with the coefficients obtained with Rajan and Subramanian's (2008) original dataset, the results obtained before the interaction terms were added are in line with those reported by the authors. The results for the variables of interest are roughly similar to those obtained with OLS. The coefficient for aid remains negative and significant, but much higher in magnitude, and also loses significance when the interactions are included. Regarding the latter, the coefficient for aid x state

[150] Bearing in mind the aforementioned remark made by Arndt, Jones and Tarp (2010: 11-12) about the fact that the missing values in the bilateral aid flows should be set to zero, the analysis was repeated treating the missing values for aid as zeros. The obtained results were very similar to those reported here.

Table 63. Cross-country IV estimations, 1990-2000

	Dependent variable: real GDP per capita growth					
	RS08 original 1990-2000			RS08 reproduced 1990-2000		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(initial pc GDP)	-2.106***	-1.785**	-1.683**	-1.744***	-1.643*	-1.468*
	(0.597)	(0.794)	(0.664)	(0.569)	(0.850)	(0.752)
Initial policy	-0.310	-0.417	-0.390	-0.0814	-0.0595	0.120
	(0.445)	(0.463)	(0.482)	(0.482)	(0.731)	(0.980)
Initial life expectancy	0.0596	0.0441	0.0382	0.0724	0.0811	0.0776
	(0.0604)	(0.0603)	(0.0687)	(0.0910)	(0.100)	(0.104)
Geography	0.609*	0.495	0.500	0.0588	0.0652	0.113
	(0.331)	(0.360)	(0.348)	(0.305)	(0.311)	(0.337)
ICRG	-0.903	-0.0440	-0.0639			
	(2.520)	(3.360)	(3.190)			
Inflation	0.00107*	0.000937	0.000893	-0.155	-0.236	-0.234
	(0.000613)	(0.000737)	(0.000636)	(0.350)	(0.442)	(0.438)
Initial M2/GDP	-0.00906	-0.0135	-0.0122	-0.0234	-0.0234	-0.0198
	(0.0114)	(0.0139)	(0.0154)	(0.0171)	(0.0211)	(0.0256)
Initial budget balance	0.215***	0.199***	0.194***	0.159**	0.154*	0.153*
	(0.0585)	(0.0715)	(0.0643)	(0.0774)	(0.0878)	(0.0867)
Revolutions	-1.360	-1.438	-1.323	-2.073	-1.949*	-1.767
	(0.873)	(0.914)	(1.125)	(1.274)	(1.174)	(1.316)
Ethnic fractionalization	0.315	-0.450	-0.708	-0.313	-0.365	-0.703
	(0.885)	(1.240)	(1.568)	(1.142)	(1.489)	(1.452)
Sub-Saharan Africa	0.183	0.276	0.447	-1.527***	-1.484**	-1.280
	(0.930)	(0.977)	(1.287)	(0.581)	(0.582)	(0.826)
East Asia	1.611**	1.769***	1.754***	1.642*	1.526	1.311
	(0.670)	(0.665)	(0.661)	(0.979)	(1.278)	(1.619)
Aid/GDP	-0.223*	-0.0616	-0.0623	-0.0613	-0.0530	-0.0274
	(0.117)	(0.248)	(0.239)	(0.136)	(0.243)	(0.210)
State ineffectiveness	-0.774***	-0.493	-0.498	-0.707***	-0.756***	-0.723***
	(0.211)	(0.450)	(0.450)	(0.191)	(0.265)	(0.235)
Political violence	0.329*	0.349	0.332	0.351	0.441	0.413
	(0.170)	(0.231)	(0.254)	(0.233)	(0.332)	(0.354)
SI x PV	0.0209	0.129	0.192	-0.0838	-0.0253	0.0928
	(0.0616)	(0.179)	(0.303)	(0.0660)	(0.157)	(0.274)
AidxState ineffectiveness		-0.116	-0.102		0.0196	0.0344
		(0.162)	(0.190)		(0.114)	(0.135)
Aid x Political violence		0.0231	0.0524		-0.0287	0.0180
		(0.0603)	(0.160)		(0.0573)	(0.119)
Aid x SI x PV			-0.0182			-0.0272
			(0.0957)			(0.0666)
Constant	17.09***	15.15*	14.62**	14.27*	12.69	11.07
	(6.556)	(7.937)	(6.814)	(8.331)	(10.53)	(9.423)
Observations	66	66	66	64	64	64
R^2	0.618	0.588	0.599	0.633	0.617	0.614
Adj. R^2	0.493	0.430	0.434	0.518	0.475	0.460
p-value of LM statistic[a]	0.0237	0.111	0.178	0.0147	0.0672	0.116
F-statistic for weak id.	7.129	0.766	0.292	4.267	0.821	0.528

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

ineffectiveness remains negative and non-significant, and the coefficient for aid x political violence is now positive but also non-significant. Thus, the results from using this dataset do not suggest any potential effect of either of these variables on the impact of aid. Additionally, the lack of significance of the triple interaction also shows no evidence of an interactive effect of the state fragility variables on aid effectiveness.

Turning now to the results derived from the reproduced dataset, in contrast with the OLS estimates, the coefficient for aid is also negative, but not significant both before and after the interaction terms are included. The lack of evidence of any effect of state ineffectiveness or political violence on the impact of aid on growth is corroborated when the reproduced dataset is used, and the triple interaction term also shows no significant effect.

I then employed the same instrument and estimated equations (4) to (6) using the reproduced dataset for the remaining periods. The results are included in Table 64.

Table 64. Cross-country IV estimations, 1993-2012

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log(in. pc GDP)	-1.605***	-1.956***	-2.081*	-1.430***	-0.805	-0.805	-2.391	-12.15	-8.826
	(0.613)	(0.732)	(1.158)	(0.389)	(1.080)	(1.138)	(2.694)	(18.95)	(12.61)
Initial policy	-0.370	-1.412*	-1.246	0.571	-0.153	-0.323	-0.316	-6.410	-3.929
	(0.551)	(0.786)	(1.495)	(0.466)	(1.181)	(1.429)	(1.076)	(10.77)	(6.947)
Initial life exp.	-0.0564	-0.129*	-0.000776	-0.0874	-0.160	-0.173	0.0511	0.235	-0.0573
	(0.0679)	(0.0678)	(0.790)	(0.109)	(0.146)	(0.148)	(0.104)	(0.418)	(0.289)
Geography	0.121	-0.0603	-0.125	0.222	-0.155	-0.202	-0.00443	0.336	0.114
	(0.200)	(0.259)	(0.430)	(0.215)	(0.643)	(0.745)	(0.393)	(1.437)	(1.069)
Inflation	-0.312	0.172	1.332	-0.109	-0.533	-0.550	13.51***	-17.84	-0.968
	(0.452)	(0.395)	(6.699)	(0.331)	(0.731)	(0.778)	(4.445)	(55.01)	(31.77)
Initial M2/GDP	-0.00446	-0.00355	0.000569	0.00659	0.00659	0.00108	-0.0162**	-0.0689	-0.0476
	(0.00656)	(0.00571)	(0.0274)	(0.0139)	(0.0150)	(0.0306)	(0.00747)	(0.0998)	(0.0637)
Initial budget bal.	0.00685	-0.0667	-0.0625	0.0908*	-0.0269	-0.0212	0.121	0.304	0.120
	(0.0516)	(0.0713)	(0.0956)	(0.0538)	(0.183)	(0.190)	(0.0820)	(0.420)	(0.244)
Revolutions	-0.0290	1.322	2.257	-0.729	-0.117	-0.447	-0.262	-1.764	-2.454
	(0.830)	(0.930)	(5.905)	(0.845)	(1.169)	(2.029)	(0.767)	(3.565)	(3.129)
Ethnic fract.	-0.206	-0.645	-1.298	-0.148	-1.969	-1.677	-0.338	5.656	3.255
	(0.700)	(0.986)	(4.344)	(0.877)	(2.589)	(2.797)	(1.564)	(10.64)	(7.326)
Sub-Saharan Afr.	-1.277**	-1.943**	-0.222	-1.250**	-1.506*	-1.849	0.480	4.446	-1.313
	(0.648)	(0.768)	(10.68)	(0.629)	(0.870)	(1.770)	(2.170)	(9.823)	(5.736)
East Asia	1.664***	2.252***	1.757	0.948	1.643	1.887	1.804***	6.537	6.433
	(0.598)	(0.743)	(3.280)	(0.937)	(1.365)	(1.970)	(0.530)	(9.684)	(7.610)
Aid/GDP	-0.169	-0.0330	0.173	-0.195	0.114	0.117	-0.285	-0.804	-0.970
	(0.146)	(0.112)	(1.181)	(0.165)	(0.499)	(0.520)	(0.486)	(1.452)	(1.394)
State ineff.	-0.710***	-0.540***	-0.305	-0.581***	-0.286	-0.332	-0.914*	-1.517	-1.672
	(0.204)	(0.177)	(1.408)	(0.162)	(0.461)	(0.481)	(0.503)	(1.589)	(1.456)
Political violence	-0.0204	-0.496	-0.544	0.0670	-0.150	-0.0816	0.292	-1.454	-0.592
	(0.218)	(0.316)	(0.455)	(0.212)	(0.430)	(0.626)	(0.276)	(3.247)	(1.954)
SI x PV	0.0375	-0.00811	0.226	-0.0351	0.0865	-0.00064	0.0324	-0.571	-0.881
	(0.0862)	(0.0936)	(1.431)	(0.0656)	(0.216)	(0.350)	(0.0512)	(1.209)	(1.297)
Aid x SI		-0.177**	-0.220		-0.196	-0.219		-1.140	-0.617
		(0.0736)	(0.212)		(0.283)	(0.328)		(1.898)	(1.109)
Aid x PV		0.0375	0.168		0.0171	-0.0456		0.880	0.148
		(0.0460)	(0.767)		(0.0550)	(0.325)		(1.549)	(0.764)
Aid x SI x PV			-0.0892			0.0326			0.170
			(0.531)			(0.152)			(0.202)
Constant	21.50**	30.18***	21.37	20.52**	20.61*	21.88***	21.83	108.8	95.77
	(9.429)	(9.387)	(55.61)	(9.189)	(11.16)	(8.283)	(19.42)	(167.3)	(124.8)
Observations	77	77	77	67	67	67	65	65	65
R^2	0.436	0.253	-0.163	0.516	0.374	0.279	0.339	-13.485	-7.060
Adj. R^2	0.298	0.0380	-0.524	0.373	0.157	0.00911	0.136	-18.72	-10.21
p-value LM stat[a]	0.0119	0.0273	0.832	0.00310	0.170	0.206	0.158	0.568	0.487
F-stat weak ident.	9.889	1.924	0.00879	8.847	0.532	0.351	1.698	0.0884	0.0979

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

Starting with the coefficient of aid before adding any interaction terms, there are some changes in the sign and significance level when compared to the OLS estimates, but there is now no indication of a significant effect on economic growth in any of the time horizons and time periods considered.

When the interaction between aid and each of the indicators of state fragility is added to the analysis, one notices that the negative and significant effect found in two of the time periods considered when using OLS methods only holds for the 20-year period. Despite being positive in most specifications, the lack of significance of the term aid x political violence does not suggest that there is an effect of the latter on the impact of aid. Finally, the sign of the triple interaction term changed and lost significance in both 10-year periods considered when compared to the OLS estimates.

A remark is in order in terms of the weakness of this instrument. The last two rows of Tables 63 and 64 contain the results for the p-value of the Lagrange-Multiplier statistic and the first-stage F-statistics.[151] Starting with Table 63, looking at columns (1) and (4), the instrument passes the first of these tests, but not the latter. Rajan and Subramanian (2008: 650) also note that the instrument they propose does not exceed the threshold of 10 when considering the 1990-2000 period. Here I find that it is even weaker when the two indicators of fragility are included in the analysis.

Additionally, the F-statistic suffers a noticeable reduction when the interaction terms are included. The instrumentation strategy used here follows the line of work exploring the potential interactive effect between aid and policy (and, namely, Burnside and Dollar, 2000) and uses as instruments for aid, aid x state ineffectiveness and aid x political violence the following: fitted aid, fitted aid x state ineffectiveness, and fitted aid x political violence, where fitted aid is the estimated value of aid obtained from the zero-stage regressions described in section 5.4.2. When the triple interaction is included, an additional instrument is considered, namely fitted aid x state ineffectiveness x political violence. Despite recognizing that this strategy is not ideal (as confirmed by the results for the tests for weak instrumentation), it was used as an attempt to consider the potential endogeneity of aid also when including the interaction with the two indicators of fragility.

[151] I recall here that the p-value of the Lagrange-Multiplier statistic is obtained from an underidentification test using the rank-based statistic developed by Kleibergen and Paap (2006), which if lower than 0.05 leads one to reject the hypothesis that the equation is underidentified. As a rule of thumb, the F-statistic should be 10 at a minimum for weak identification not to be considered a problem (Staiger and Stock, 1999).

In the case of the estimations included in Table 64, they indicate that the instrument proposed by Rajan and Subramanian (2008) performs relatively well for periods 1993-2012 and 1993-2002 before any interaction terms are included, but it is much weaker when the later 10-year period is considered (i.e. 2003-2012). Additionally, there is a significant loss in the overall explanatory power of the model when the interaction terms are added to the analysis.

Rajan and Subramanian (2008) perform a few additional estimations to assess the robustness of their instrument. I follow their guidelines and repeat the same robustness checks for the estimation of baseline equation (4). These tests are represented in Table 65 for all the datasets considered. For simplicity, only the coefficients for the variables of interest were included. First, the authors assess whether the instrument is plausibly exogenous in order to address the concern that the colonial variables used in its construction may also be growth determinants. This is tested by re-estimating the growth equation with the addition of the colonial variables for the UK, France and Spain (results A in Table 65). Secondly, they check whether the instrument passes the overidentification tests by using the logarithm of area as an additional instrument. In the same light, I re-run regression (4) using both the estimated value for aid and the log of area as instruments (results B in Table 65). Finally, Rajan and Subramanian (2008) estimate the first-stage regression with log(area) as an instrument for aid, and their constructed instrument for aid is included as a regressor in the second-stage estimation directly (results C in Table 65).

The first group of results (results A) shows that, apart from slight changes in magnitude, there are no other significant changes in the coefficients for aid in either of the datasets considered. Additionally, with the exception of the dummy for French colonies in two of the datasets considered, there appears to be no significant effect of any of the colonial variables on growth, which leads one to conclude that they pass the exclusion restriction, thus providing support to the use of the instrument proposed by Rajan and Subramanian (2008).

Results B, obtained when the log of area is included as an additional instrument, are also similar to the coefficients obtained in the baseline regressions. Furthermore, the p-value for the Hansen J test suggests that Rajan and Subramanian's (2008) instrument passes the overidentification restrictions. Finally, when fitted aid is included as a control variable (results C), the obtained results show no significant independent effect of this variable on growth.

Table 65. Robustness checks to Rajan and Subramanian's (2008) instrument

Results A: Addition of three colony dummies as controls

	Dependent variable: real GDP per capita growth				
	RS08 original	RS08 reproduced			
	1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
	(1)	(2)	(3)	(4)	(5)
Aid/GDP	-0.197*	-0.0779	-0.0836	-0.209	-0.229
	(0.101)	(0.137)	(0.104)	(0.128)	(0.228)
Colony UK	-0.402	0.621	-0.336	-0.260	-0.327
	(0.613)	(0.733)	(0.528)	(0.637)	(0.885)
Colony France	-0.325	0.277	-1.852***	-0.440	-2.323*
	(0.733)	(0.584)	(0.520)	(0.613)	(1.191)
Colony Spain	-0.221	0.182	-0.492	-0.795	-1.284
	(0.832)	(0.647)	(0.475)	(0.658)	(0.782)
Observations	66	64	77	67	65
R^2	0.630	0.632	0.558	0.523	0.503
p-value of LM statistic[a]	0.0189	0.00730	0.00521	0.00150	0.0325
F-stat for weak ident.	8.425	4.531	14.72	9.771	5.898

Results B: Fitted aid and log(area) as instruments (second-stage)

	Dependent variable: real GDP per capita growth				
	RS08 original	RS08 reproduced			
	1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
	(1)	(2)	(3)	(4)	(5)
Aid/GDP	-0.216**	-0.0923	-0.169	-0.137	-0.183
	(0.102)	(0.123)	(0.146)	(0.166)	(0.375)
Observations	66	64	77	67	65
R^2	0.621	0.620	0.437	0.523	0.428
p-value[b]	0.901	0.664	0.527	0.210	0.520
p-value of LM statistic[a]	0.00614	0.0344	0.0144	0.00877	0.336
F-stat for weak ident.	6.480	3.268	5.567	4.873	1.043

Results C: Log(area) as instrument and fitted aid as control (second-stage)

	Dependent variable: real GDP per capita growth				
	RS08 original	RS08 reproduced			
	1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
	(1)	(2)	(3)	(4)	(5)
Aid/GDP	-0.197	-0.206	10.79	0.540	0.238
	(0.182)	(0.310)	(419.9)	(0.991)	(0.751)
Fitted aid/GDP	-0.0152	0.0713	-7.651	-0.340	-0.138
	(0.122)	(0.178)	(292.4)	(0.445)	(0.217)
Observations	66	64	77	67	65
R^2	0.628	0.549	-263.166	-0.222	0.433
p-value of LM statistic[a]	0.00708	0.0523	0.979	0.354	0.466
F-stat for weak ident.	6.823	3.012	0.000521	0.710	0.381

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified. [b]p-value of Hansen J statistic, which tests the overidentifying restrictions.

Rajan and Subramanian (2008) add that, when both the log of area and fitted aid are included as instruments, the fact that the coefficient for log of area is not significant in most regressions in the first-stage, as opposed to their preferred instrument, indicates that the latter contains more information than just the recipient size. In the analysis presented here, this is true for all the datasets considered apart from the one for period 1990-2000 and Rajan and Subramanian's (2008) original data.[152] However, this claim has been defied by Bazzi and Clemens (2013: 57) who argue that the instrument

[152] The results are not included here for reasons of space and simplicity.

proposed by Rajan and Subramanian (2008) has barely any information other than the population size of the recipient country.

Recognizing the pertinence of Bazzi and Clemens' (2013) criticism, I run an additional set of regression specifications to assess whether Rajan and Subramanian's (2008) instrument holds when the logarithm of the initial level of population is considered.[153] When the log of population is included as an additional control in the baseline regression, one observes some changes in the sign, magnitude and significance of aid, but the coefficient for the additional variable is significant in only two of the specifications. Bazzi and Clemens (2013) report a significant reduction in the strength of the instrument, which I also find with the different datasets considered here.

Secondly, when using the log of population as the sole instrument Bazzi and Clemens (2013) find similar results to those obtained when fitted aid is employed. In the analysis presented here, even though using the log of population as an instrument does not entail significant changes in the coefficients obtained for the variables of interest for the two datasets using period 1990-2000 and for the decade 2003-2012, the coefficient for aid becomes significant for periods 1993-2012 and 1993-2002. When looking at the results for the test of underidentification, one can reject the null hypothesis that the structural equation is underidentified in all the specifications when log of population is the only instrument, apart from period 2003-2012. Furthermore, the F-stat is below 10 in most regressions, but not by much, with the exception of period 1993-2002. Thus, the results reported here lend some support to Bazzi and Clemens' (2013) argument when Rajan and Subramanian's (2008) original dataset is considered, but they do not seem as alarming when different periods are used for the reproduced dataset. Still, the doubts cast on the strength of Rajan and Subramanian's (2008) proposed instrument are further explored in section 5.5.3.

c) Summary of results

The next section presents and discusses the estimated coefficients obtained with panel data. Before that, I take stock of the conclusions reached so far, summarised in Table 66. Firstly, there is no definite verdict about the effect of aid on growth before any interactive effects are considered, given that the sign of the coefficient changes depending on the data used, and it is significant in only some of the periods considered.

[153] A table with the main results can be found in Table D3.1 in Appendix D3.

Table 66. Summary of results with cross-country data

	OLS	IV
Aid*	The sign varies depending on the period and time horizon considered. It is significant only when the original dataset is used and for period 1993-2002 using the reproduced dataset.	The sign is negative in all specifications considered, but the coefficient is significant only when Rajan and Subramanian's (2008) dataset is used.
Aid x SI	Negative sign in all specifications. However, it is significant only for periods 1993-2012 and 2003-2012.	Negative sign in most specifications. Still, with the exception of one specification for period 1993-2012, the coefficient is not significant.
Aid x PV	Positive effect in most specifications, but it is never significant, with the exception of one specification.	Positive sign in most specifications, but the coefficient is never significant.
Aid x SI x PV	Negative sign in all specifications. It is significant when the reproduced dataset is used for the two 10-year periods (1993-2002 and 2003-2012).	The sign of the coefficient varies depending on the period considered, but it never shows a significant effect.

Notes: *Aid refers to the coefficient for aid in the baseline estimations, i.e. before any interaction terms between this variable and the indicators of state fragility are included.

In terms of the sign of the interactions between aid and the two indices, the results suggest that aid may be less effective in countries with higher levels of state ineffectiveness, but more effective in countries with higher levels of political violence. However, one rarely finds any significant coefficient, which indicates that neither of these symptoms appears to have an impact on aid effectiveness. Finally, a similar conclusion can be drawn for the interactive effect between the three variables.

5.5.2. Panel evidence

In line with other studies examining the link between aid and growth (e.g. Rajan and Subramanian, 2008; Lessmann and Markwardt, 2012; or Clemens et al., 2012), this section explores the impact of state fragility on aid effectiveness using panel data. The attention is now placed on the reproduced dataset and on the full period, 1993-2012. I consider 5-year averages (beginning with period 1993-1997) as well as 10-year averaged data (starting in 1993-2002). In line with the previous section, the results obtained with OLS are presented first, being followed by the FE estimates, and later by the coefficients obtained with IV methods.

a) OLS estimates

Table 67 contains the coefficients obtained from estimating equations (4) to (6) with OLS. Once again, the baseline results represented in Columns (1) and (4) are included for comparison of the coefficient for aid before and after the inclusion of any interaction

Table 67. Panel OLS estimations, 1993-2012

	Dependent variable: real GDP per capita growth					
	5-year averages			10-year averages		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(initial pc GDP)	-1.662***	-1.480***	-1.379***	-1.585***	-1.409***	-1.404***
	(0.531)	(0.445)	(0.417)	(0.277)	(0.289)	(0.293)
Policy	0.0901	0.0272	0.0987	-0.532	-0.627	-0.602
	(0.544)	(0.584)	(0.612)	(0.476)	(0.461)	(0.472)
Initial life expectancy	0.0419	0.0210	0.0263	-0.0211	-0.0292	-0.0201
	(0.0513)	(0.0471)	(0.0473)	(0.0389)	(0.0362)	(0.0398)
Geography	0.289	0.209	0.210	0.0874	0.0443	0.0545
	(0.234)	(0.242)	(0.243)	(0.201)	(0.207)	(0.206)
Inflation	-0.185	-0.392	-0.371	0.0666	-0.156	-0.129
	(1.037)	(1.061)	(1.080)	(0.433)	(0.471)	(0.482)
M2/GDP	-0.0106	-0.0108	-0.00955	-0.0155**	-0.0158**	-0.0154**
	(0.00730)	(0.00745)	(0.00737)	(0.00735)	(0.00684)	(0.00700)
Budget balance	0.201***	0.178***	0.172***	0.0981**	0.0855**	0.0900**
	(0.0655)	(0.0574)	(0.0562)	(0.0424)	(0.0409)	(0.0400)
Revolutions	-1.197***	-1.175***	-1.144**	-0.751	-0.683	-0.634
	(0.449)	(0.443)	(0.433)	(0.460)	(0.454)	(0.432)
Ethnic fractionalization	0.615	0.247	0.0163	0.373	0.225	0.198
	(0.780)	(0.791)	(0.797)	(0.773)	(0.730)	(0.738)
Sub-Saharan Africa	-1.154	-1.294*	-1.094	-1.402**	-1.456**	-1.341*
	(0.741)	(0.719)	(0.760)	(0.675)	(0.674)	(0.701)
East Asia	1.018*	1.104*	1.055	1.687***	1.754***	1.700***
	(0.604)	(0.650)	(0.647)	(0.592)	(0.572)	(0.573)
Aid/GDP	-0.121	-0.0277	-0.000131	-0.124***	-0.0193	-0.00960
	(0.0746)	(0.0653)	(0.0722)	(0.0368)	(0.0402)	(0.0457)
State ineffectiveness	-0.609***	-0.520***	-0.469**	-0.730***	-0.613***	-0.597***
	(0.177)	(0.177)	(0.183)	(0.140)	(0.129)	(0.134)
Political violence	0.270**	0.296**	0.272**	0.170	0.144	0.131
	(0.126)	(0.138)	(0.128)	(0.113)	(0.115)	(0.111)
SI x PV	-0.00237	0.0577	0.106	0.0207	0.0495	0.0686
	(0.0581)	(0.0529)	(0.0697)	(0.0536)	(0.0539)	(0.0586)
Aid x SI		-0.0547	-0.0539		-0.0602***	-0.0575**
		(0.0353)	(0.0351)		(0.0218)	(0.0221)
Aid x PV		-0.0198	0.0211		0.0103	0.0297
		(0.0307)	(0.0459)		(0.0191)	(0.0306)
Aid x SI x PV			-0.0215			-0.00851
			(0.0208)			(0.0123)
Constant	14.91***	16.96***	15.53***	20.42***	19.42***	18.67***
	(4.150)	(4.048)	(3.987)	(2.627)	(2.473)	(2.752)
Observations	179	179	179	132	132	132
R^2	0.418	0.442	0.449	0.491	0.520	0.523
Adj. R^2	0.356	0.375	0.379	0.420	0.444	0.442

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

terms. The two interaction terms between aid and each of the symptoms of state fragility are then added in order to test hypotheses *H1.1* and *H1.2*, and the corresponding results are portrayed in columns (2) and (5). Finally, hypothesis *H2* is tested with the addition of the triple interaction term and the obtained coefficients are reported in columns (3) and (6).

Overall, even if the values for the explanatory power of the model are slightly lower than those obtained with cross-country data, one observes that it captures the individual effects of the variables more easily. As concerns the variables of interest, the results obtained before including the interaction terms indicate that the coefficient for aid is negative, but significant only when 10-year averages are used.

The inclusion of the interaction between the aid variable and the fragility indices leads to a reduction in the absolute value of the coefficient for aid and to a loss of significance in the case of the dataset with 10-year averages. In line with the cross-country results, the sign of the coefficient for the interaction between aid and state ineffectiveness is negative in both datasets, but one finds a significant effect only when the second dataset is considered.

Also similarly to the results obtained in the previous section, the interaction term between aid and political violence has a positive coefficient in almost all specifications, but it is non-significant. Finally, the small negative coefficients obtained for the triple interaction are similar to those obtained with the cross-country dataset, but do not show a significant effect.[154]

b) FE estimates

In using OLS methods, the analysis so far did not consider the panel structure of the data. Similarly to Chapter 4, I run a battery of tests to understand whether fixed-effects or random effects methods would be more appropriate than pooled OLS. The results are summarised in Table 68. The first test is the Breusch and Pagan Lagrange multiplier test (Breusch and Pagan, 1980), which has a null hypothesis that the variances across entities are zero. The results from this test indicate that one cannot reject the null hypothesis, thus suggesting that random effects is not more appropriate than pooled OLS.

Table 68. Diagnostic tests for panel data estimators

	p-values	
	5-year averages	10-year averages
Breusch and Pagan Lagrangian multiplier test	0.0657	0.0625
F-test of $u_i = 0$	0.0000	0.0010
Hausman test	0.0000	0.1037

The second row of Table 68 corresponds to the F-test that the observed and unobserved fixed effects are equal to zero. The results show that one rejects the null hypothesis, which points to the use of the fixed effects estimator. Finally, the Hausman test is used

[154] Similarly to the cross-country analysis, the estimations were repeated setting missing entries in the bilateral aid flows as zero to obtain the value for total aid, as recommended by Arndt, Jones and Tarp (2010: 11-12). Again, this led to very similar results.

to compare fixed effects with random effects. The results for the 5-year averaged data lead to the rejection of the null hypothesis that the estimated coefficient with random effects is efficient, and thus suggest the use of fixed effects. However, the same does not hold when 10-year averaged data are used.[155] In light of these results, I include in Table 69 the results obtained when the fixed effects estimator is employed.

Table 69. Panel FE estimations, 1993-2012

	Dependent variable: real GDP per capita growth					
	5-year averages			10-year averages		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(initial pc GDP)	-12.85***	-13.13***	-13.17***	-6.332***	-6.039***	-6.170***
	(1.500)	(1.661)	(1.614)	(0.907)	(0.948)	(0.987)
Policy	-1.208	-0.911	-1.044	-1.053	-0.975	-1.163
	(0.877)	(0.954)	(0.978)	(0.769)	(0.774)	(0.757)
Initial life expectancy	0.0181	0.0357	0.0230	-0.0205	-0.0266	-0.0233
	(0.0625)	(0.0665)	(0.0673)	(0.0574)	(0.0554)	(0.0556)
Inflation	-1.567	-1.547	-1.631	-0.886	-1.076*	-1.067*
	(1.391)	(1.398)	(1.409)	(0.628)	(0.618)	(0.610)
M2/GDP	-0.00495	-0.00532	-0.000743	-0.0294	-0.0252	-0.0227
	(0.0140)	(0.0142)	(0.0140)	(0.0197)	(0.0194)	(0.0194)
Budget balance	0.0705	0.0582	0.0638	0.0964	0.0859	0.0829
	(0.0800)	(0.0797)	(0.0812)	(0.0821)	(0.0799)	(0.0758)
Revolutions	-1.091*	-1.111*	-1.104*	0.123	-0.121	-0.279
	(0.580)	(0.578)	(0.585)	(0.518)	(0.501)	(0.556)
Aid/GDP	0.0949	-0.0222	-0.0302	0.0709	0.337	0.370
	(0.0872)	(0.153)	(0.148)	(0.124)	(0.218)	(0.231)
State ineffectiveness	-0.680	-0.975*	-0.946*	-0.241	0.553	0.603
	(0.496)	(0.530)	(0.521)	(0.457)	(0.597)	(0.596)
Political violence	0.402	0.556*	0.626**	0.270	0.219	0.350
	(0.283)	(0.289)	(0.289)	(0.343)	(0.358)	(0.396)
SI x PV	-0.137	-0.110	-0.275	-0.0550	-0.000869	-0.110
	(0.0911)	(0.0948)	(0.170)	(0.130)	(0.124)	(0.178)
Aid x SI		0.0699	0.0616		-0.149*	-0.193**
		(0.0823)	(0.0775)		(0.0756)	(0.0969)
Aid x PV		-0.0648	-0.158**		0.0200	-0.0691
		(0.0481)	(0.0629)		(0.0349)	(0.0995)
Aid x SI x PV			0.0661			0.0456
			(0.0446)			(0.0500)
Constant	112.2***	113.5***	114.7***	58.57***	55.65***	56.67***
	(13.47)	(14.22)	(13.90)	(8.121)	(8.427)	(8.715)
Observations	222	222	222	165	165	165
R^2	0.726	0.730	0.734	0.723	0.740	0.744
Adj. R^2	0.709	0.710	0.713	0.701	0.716	0.718

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

There are some differences in the obtained coefficients when compared to those obtained with pooled OLS. The term aid x state ineffectiveness holds a positive sign now

[155] The Mundlak (1978) approach was used to confirm the results obtained. This alternative to the Hausman test estimates random effect regressions adding group-means of independent variables to the model. The results of the test for both the 5-year and 10-year averaged datasets rejected the null hypothesis that the panel-level means are jointly zero, lending support to the use of fixed effects.

when 5-year averaged data are used, but remains non-significant, whereas the negative and significant result is maintained for the dataset obtained with 10-year averages.

The sign of the coefficient for the interaction between aid and political violence is now negative in most specifications, but significant in only one of them. Finally, despite still being small in magnitude, there is a change in the sign of the coefficient for the triple interaction, which is now positive, but not significant.[156]

c) IV estimates

In order to account for endogeneity, and in line with the analysis in previous sections, fitted aid is used as an instrument to obtain the results presented in Table 70 [following Rajan and Subramanian's (2008) strategy].

Before discussing the results, it is important to highlight that there is again a dramatic drop in the explanatory power of the model, especially when the interaction terms are added, and in particular when the dataset for the 10-year averages is used. Additionally, the concerns over the strength of the instrument raised in the previous section are heightened here. Thus, I will discuss the results obtained for the main variables of interest, but the following comments should still be read with caution.

The main conclusions for the coefficients of interest do not differ greatly from the results estimated with OLS. The coefficient for aid before the interaction terms are included shows a negative effect of this variable on growth, but significant only when 10-year averaged data are used.

Aid x state ineffectiveness maintains the negative sign, but it is significant in only one of the specifications. There is still no indication of a significant interactive effect between aid and political violence. Despite the change in sign and magnitude for the 10-year averaged dataset, the triple interaction term remains non-significant in both of the datasets used.

[156] Additional estimations were run using the Least Squares Dummy Variable method, which corresponds to including country dummies in the regressions. None of the coefficients for the variables of interest showed a significant effect.

Table 70. Panel IV estimations, 1993-2012

	Dependent variable: real GDP per capita growth					
	5-year averages			10-year averages		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(initial pc GDP)	-2.110**	-3.753	-2.568	-1.951***	-2.278**	-6.595
	(1.009)	(4.813)	(1.869)	(0.438)	(0.904)	(77.99)
Policy	-0.0975	-3.462	-2.314	-0.847	-2.055*	-5.571
	(0.620)	(6.178)	(2.131)	(0.538)	(1.083)	(68.90)
Initial life expectancy	0.0233	-0.221	-0.153	-0.0476	-0.137*	-1.696
	(0.0598)	(0.415)	(0.174)	(0.0492)	(0.0769)	(25.15)
Geography	0.257	-0.680	-0.501	0.0443	-0.209	-1.262
	(0.217)	(1.597)	(0.829)	(0.194)	(0.314)	(17.51)
Inflation	-0.0328	1.049	0.525	0.132	0.0610	4.249
	(0.891)	(3.051)	(1.375)	(0.406)	(0.729)	(67.83)
M2/GDP	-0.00889	-0.00799	-0.00523	-0.0141*	-0.0146*	-0.130
	(0.00865)	(0.0198)	(0.0216)	(0.00719)	(0.00770)	(1.904)
Budget balance	0.198***	0.159	0.127	0.0752*	0.0163	-0.178
	(0.0592)	(0.110)	(0.143)	(0.0418)	(0.0620)	(3.218)
Revolutions	-0.944	0.248	-0.0671	-0.436	0.194	-14.95
	(0.628)	(2.174)	(1.063)	(0.498)	(0.684)	(236.9)
Ethnic fractionalization	0.817	-1.096	-1.842	0.349	0.166	12.31
	(0.753)	(3.529)	(4.758)	(0.777)	(1.248)	(206.6)
Sub-Saharan Africa	-1.118	-2.248	-1.472	-1.261*	-1.444*	-26.55
	(0.742)	(2.069)	(2.369)	(0.648)	(0.855)	(404.0)
East Asia	0.877	1.808	1.566	1.535***	1.944**	16.84
	(0.638)	(1.797)	(1.264)	(0.580)	(0.813)	(241.0)
Aid/GDP	-0.242	-0.0746	0.133	-0.241**	-0.0582	-2.879
	(0.250)	(0.508)	(0.719)	(0.122)	(0.191)	(45.36)
State ineffectiveness	-0.687***	-0.269	-0.0760	-0.795***	-0.434*	-4.664
	(0.189)	(0.612)	(1.059)	(0.148)	(0.222)	(67.47)
Political violence	0.171	-1.034	-0.714	0.0564	-0.467	1.324
	(0.204)	(2.305)	(0.962)	(0.144)	(0.352)	(24.96)
SI x PV	-0.0124	-0.169	0.101	0.0229	-0.000435	-5.583
	(0.0579)	(0.524)	(0.589)	(0.0474)	(0.130)	(89.51)
Aid x SI		-0.611	-0.507		-0.299*	-0.463
		(0.952)	(0.489)		(0.168)	(4.316)
Aid x PV		0.253	0.296		0.139	-2.925
		(0.533)	(0.600)		(0.109)	(48.26)
Aid x SI x PV			-0.0698			1.679
			(0.246)			(27.00)
Constant	22.61**	58.21	41.25*	25.77***	35.88***	199.4
	(11.24)	(76.26)	(22.58)	(5.990)	(11.62)	(2,721)
Observations	179	179	179	132	132	132
R^2	0.399	-1.539	-0.730	0.454	-0.110	-137.815
Adj. R^2	0.335	-1.842	-0.949	0.379	-0.286	-161.4
p-value of LM statistic[a]	0.0109	0.500	0.282	0.00128	0.0394	0.951
F-stat for weak ident.	7.007	0.137	0.260	12.25	1.455	0.000802

Notes: Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

d) Summary of results

This section ends with a brief overview of the insights provided by the panel datasets (see Table 71). These are restricted to the variables of interest in this chapter and thus refer to the coefficients obtained with the estimation of equations (4) to (6). Table 71 offers more detail, but the overall conclusion from this section is that there is no evidence supporting the hypotheses that aid is less effective in countries with high levels of state ineffectiveness or political violence. There is also no support to the view that aid will be even less effective when countries have high levels of both dimensions of fragility.

Table 71. Summary of results with panel data

	OLS	IV
Aid*	Negative effect, but significant only when 10-year averaged data are used.	Negative effect, but significant only when 10-year averaged data are used.
Aid x SI	Negative and significant effect with 10-year averaged data, but loses significance when 5-year averages are used.	Negative sign in all specifications, but the coefficient is significant in only one of them.
Aid x PV	Positive sign in most specifications, but it is not significant in any of them.	Positive sign in most specification, although the coefficient is never significant.
Aid x SI x PV	The sign is negative, but the coefficient is not significant in any of the datasets used.	The effect is not significant, and the sign of the coefficient changes with the dataset used.

Notes: *Aid refers to the coefficient for aid in the baseline estimations, i.e. before any interaction terms between this variable and the indicators of state fragility are included.

5.5.3. Robustness checks

In this section, the results obtained previously in the chapter are subjected to further scrutiny. I will focus now on the results obtained with the reproduced dataset and use the main period of analysis, i.e. 1993-2012, and allow for three changes.

Firstly, I examine the consequences of excluding from the analysis the observations identified as outliers in section 5.4.2. As described in the literature review in section 5.2.4, recent studies have highlighted the fact that aid flows are not homogeneous, and that different types of aid may entail diverse expected effects on growth. This proposition is explored in the second part of this section. Finally, in the last part I use alternative approaches to overcoming the endogeneity of aid. To be specific, I explore two different avenues: a) employ Arndt, Jones and Tarp's (2010) instrument, which follows the tradition of Rajan and Subramanian's (2008) zero-stage approach; and b) use as instruments the list of exogenous variables proposed by Lessmann and Markwardt (2012).

a) Excluding outliers

This first part takes into account the insights offered by the preliminary analysis included in section 5.4.2 to identify potential outliers. I recall here that the results revealed as potential influential observations for the cross-country datasets: a) India, Israel, Cape Verde, Congo (Democratic Republic) and Cyprus for period 1993-2012; b) Nicaragua and Angola for period 1993-2002; and c) India for period 2003-2012. The results in Table 72 correspond to the coefficients obtained with OLS and IV for the main variables of interest, after dropping these observations.

Table 72. Cross-country OLS and IV estimations after excluding outliers, 1993-2012

	Results A: OLS estimates								
	Dependent variable: real GDP per capita growth								
	20-year[1] 1993-2012			10-year[2] 1993-2002			10-year[3] 2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aid/GDP	-0.102*	0.00952	0.0158	-0.168**	-0.112	-0.0779	0.0354	0.130*	0.198**
	(0.0576)	(0.0714)	(0.0760)	(0.0663)	(0.0810)	(0.0809)	(0.0892)	(0.0720)	(0.0847)
Aid x SI		-0.0479*	-0.0445		-0.0408	-0.0223		-0.0684**	-0.0740**
		(0.0255)	(0.0288)		(0.0343)	(0.0413)		(0.0331)	(0.0334)
Aid x PV		-0.00228	0.0332		0.0104	0.0975**		0.0188	0.0905*
		(0.0211)	(0.0454)		(0.0217)	(0.0380)		(0.0343)	(0.0497)
Aid x SI x PV			-0.0171			-0.0424**			-0.0230**
			(0.0231)			(0.0178)			(0.0105)
Observations	72	72	72	65	65	65	64	64	64
R^2	0.522	0.547	0.551	0.543	0.552	0.592	0.477	0.526	0.557
Adj. R^2	0.394	0.405	0.399	0.403	0.390	0.432	0.314	0.350	0.379
	Results B: IV estimates								
	Dependent variable: real GDP per capita growth								
	20-year[1] 1993-2012			10-year[2] 1993-2002			10-year 2003-2012		
	(1)	(2)	(7)	(8)	(9)	(6)	(7)	(8)	(9)
Aid/GDP	-0.406*	-0.117	0.148	-0.279*	0.0825	0.0846	-0.316	-4.793	-6.017
	(0.214)	(0.298)	(0.219)	(0.166)	(0.527)	(0.547)	(0.671)	(27.47)	(28.95)
Aid x SI		-0.165*	-0.225*		-0.205	-0.219		-2.914	-1.414
		(0.0944)	(0.129)		(0.244)	(0.315)		(15.94)	(7.186)
Aid x PV		0.0187	-0.723		0.0250	-0.00376		1.879	-0.467
		(0.0508)	(0.530)		(0.0581)	(0.325)		(10.51)	(2.940)
Aid x SI x PV			0.342			0.0154			0.581
			(0.251)			(0.153)			(2.651)
Observations	72	72	72	65	65	65	64	64	64
R^2	0.301	0.092	-1.348	0.525	0.369	0.323	0.270	-160.540	-93.428
Adj. R^2	0.114	-0.194	-2.146	0.379	0.141	0.0585	0.0414	-220.2	-131.2
p-value LM stat[a]	0.0417	0.00700	0.209	0.00095	0.119	0.218	0.309	0.859	0.832
F-stat weak id	4.300	3.107	0.549	10.46	0.682	0.320	0.893	0.00763	0.00796

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [1]Considers the original sample of countries and excludes India, Israel, Cape Verde, Congo, D. R. and Cyprus. [2]Considers the original sample of countries and excludes Nicaragua and Angola. [3]Considers the original sample of countries and excludes India.

The coefficients entail some differences when compared to those obtained with the full dataset. Starting with the OLS estimates, the baseline results for the aid coefficient show a negative and significant effect of this variable, now in two of the periods. Still, with the exception of period 2003-2012, the significance level of the coefficient drops when the interaction terms are included. The negative coefficient for the interaction between aid and state ineffectiveness is maintained in all periods considered. There is reduction in the significance level for the 20-year period, but it increases for the decade 2003-2012. In the case of aid x political violence, there is only a minor change in its significance level when the triple interaction term is included for period 2003-2012. Finally, the results for the triple interaction suggest the same as before.

Looking at results B, similarly to the OLS estimates, one now observes a negative and significant effect for the coefficient of aid in two of the specifications considered. The results for the interaction term between this variable and the two symptoms of fragility are similar to those obtained before. The negative and significant effect for the triple interaction term obtained with OLS does not survive the application of the instrumentation strategy. Again, the tests for instrument strength raise doubts about Rajan and Subramanian's (2008) instrument, especially for the period 2003-2012.

I now discuss the coefficients obtained after dropping the outliers in the panel datasets and using the same methods as before. The preliminary analysis described in section 5.4.2 highlighted as potential outliers the observations for Sierra Leone and Brazil in 1993-1997 when using 5-year averages; and for Rwanda and Angola in 1993-2002 when using panel data with 10-year averages. The results for the main variables of interest obtained after dropping these observations are portrayed in Table 73.

Table 73. Panel OLS and IV estimations after excluding outliers, 1993-2012

Results A: OLS estimates

	Dependent variable: real GDP per capita growth					
	5-year averages[1]			10-year averages[2]		
	(1)	(2)	(3)	(4)	(5)	(6)
Aid/GDP	-0.0294	0.0319	0.0263	-0.138***	-0.0356	-0.0250
	(0.0536)	(0.0620)	(0.0666)	(0.0456)	(0.0432)	(0.0494)
Aid x SI		-0.0468	-0.0466		-0.0564**	-0.0549**
		(0.0324)	(0.0323)		(0.0227)	(0.0225)
Aid x PV		0.0150	0.00522		0.00185	0.0185
		(0.0238)	(0.0413)		(0.0237)	(0.0369)
Aid x SI x PV			0.00632			-0.00676
			(0.0212)			(0.0125)
Observations	177	177	177	130	130	130
R^2	0.401	0.410	0.411	0.484	0.516	0.518
Adj. R^2	0.337	0.339	0.335	0.411	0.437	0.434

Results B: IV estimates

	Dependent variable: real GDP per capita growth					
	5-year averages[1]			10-year averages[2]		
	(1)	(2)	(3)	(4)	(5)	(6)
Aid/GDP	-0.0987	-0.172	0.0610	-0.258*	-0.0742	7.413
	(0.311)	(0.837)	(0.562)	(0.136)	(0.198)	(251.6)
Aid x SI		-0.594	-0.496		-0.293*	0.791
		(0.888)	(0.454)		(0.168)	(33.27)
Aid x PV		0.259	0.298		0.128	7.232
		(0.566)	(0.620)		(0.113)	(240.2)
Aid x SI x PV			-0.0724			-4.044
			(0.261)			(135.4)
Observations	177	177	177	130	130	130
R^2	0.395	-2.036	-1.034	0.453	-0.102	-783.896
Adj. R^2	0.330	-2.403	-1.295	0.375	-0.281	-919.5
p-value of LM statistic[a]	0.0359	0.530	0.308	0.00108	0.0396	0.976
F-stat for weak ident.	4.478	0.121	0.251	13.54	1.446	0.000189

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [1]Considers the original sample of countries and excludes the observations for Sierra Leone and Brazil in 1993-1997. [2]Considers the original sample of countries and excludes the observations for Rwanda and Angola in 1993-2002.

In general, the estimates entail very similar conclusions to the ones drawn before. Similarly to the findings with the full dataset, the conclusions that can be derived from the same dataset using IV methods are limited, as suggested by the warning levels of the R^2.

One finds no significant effect for any of the variables of interest when the dataset obtained with 5-year averages is used. Looking at the results from the 10-year averaged data, the negative and significant impact of aid on growth before any interactive effects are considered is maintained, independent of the method used. In line with the coefficients obtained with the full dataset, there appears to be a negative and significant interactive effect between aid and state ineffectiveness. Finally, there is no indication of a significant interactive effect between aid and political violence, or between these two variables and state ineffectiveness.

b) Disaggregation of aid

In an influential paper in the aid effectiveness literature, Clemens et al. (2012) argue that development assistance is heterogeneous, and thus, different categories of development assistance may have distinct effects on growth. The proposals have varied, and authors have used several criteria to distinguish between aid flows, for instance, based on the channel through which it reaches the donor (bilateral vs. multilateral), the timing of the expected results (early-impact vs. long-term impact), or even the sector it is intended to contribute to (e.g. education, health, or infrastructure).[157] In the following paragraphs I focus on the first two of these criteria [in line with Rajan and Subramanian (2008), who also consider Clemens et al.'s (2012) division], a choice made on the basis of data availability.

In Besley and Persson's (2011a) approach, the effects of different categories of aid are based on a distinction between cash aid and non-cash aid. The latter is then subdivided into technical assistance, military assistance, and post-conflict assistance. Despite recognizing the pertinence of this disaggregation for the purposes of the present analysis, the aid categories provided by the OECD-DAC dataset do not allow for a direct correspondence with Besley and Persson's (2011a) distinction. Additionally, available data on military assistance are still rather limited. Thus, in order to prevent measurement problems in the flows of aid by category, and to enable the comparison

[157] See the review in section 5.2.4 for more details.

with previous studies, I consider, first, a distinction between bilateral and multilateral flows, and afterwards between early-impact, late-impact and humanitarian aid.

The results in Table 74 were derived from the distinction between two categories of aid: bilateral and multilateral. According to the OECD-DAC's (2016) definition, the first includes flows provided directly by a donor country to an aid recipient country, whereas multilateral flows are channeled via an international organization active in development (e.g. World Bank, UNDP). I consider the cross-country data for the two time horizons, 20 years (1993-2012) and 10 years (1993-2002 and 2003-2012), and use OLS methods.

Table 74. Cross-country OLS estimations with bilateral and multilateral aid, 1993-2012

Results A: Bilateral aid

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bilateral aid/GDP	-0.0936	0.0139	0.133	-0.153	-0.0690	-0.0201	0.0278	0.164	0.303**
	(0.127)	(0.0613)	(0.100)	(0.102)	(0.131)	(0.141)	(0.133)	(0.111)	(0.139)
Bilateral aid x SI		-0.0859**	-0.103***		-0.0467	-0.0355		-0.0836*	-0.103**
		(0.0344)	(0.0321)		(0.0526)	(0.0680)		(0.0490)	(0.0480)
Bilateral aid x PV		-0.0449	0.0493		-0.00827	0.149*		0.00798	0.127*
		(0.0340)	(0.0462)		(0.0362)	(0.0757)		(0.0486)	(0.0755)
Bil. aid x SI x PV			-0.0450**			-0.0776**			-0.0357**
			(0.0217)			(0.0369)			(0.0170)
Observations	77	77	77	67	67	67	65	65	65
R^2	0.452	0.563	0.590	0.507	0.514	0.556	0.498	0.545	0.574
Adj. R^2	0.317	0.437	0.462	0.362	0.346	0.389	0.344	0.381	0.407

Results B: Multilateral aid

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Multilateral aid /GDP	-0.205*	0.112	0.192	-0.319***	-0.106	-0.0530	0.0373	0.301*	0.310*
	(0.111)	(0.126)	(0.174)	(0.119)	(0.174)	(0.168)	(0.168)	(0.155)	(0.170)
Multilateral aid x SI		-0.147**	-0.144**		-0.106	-0.0241		-0.213**	-0.201**
		(0.0561)	(0.0630)		(0.102)	(0.104)		(0.0927)	(0.0945)
Multilateral aid x PV		-0.00315	0.0804		0.00401	0.213**		0.0713	0.200*
		(0.0462)	(0.0985)		(0.0589)	(0.0851)		(0.0856)	(0.113)
Mult. aid x SI x PV			-0.0433			-0.101**			-0.0514*
			(0.0472)			(0.0396)			(0.0277)
Observations	77	77	77	67	67	67	65	65	65
R^2	0.465	0.528	0.535	0.535	0.551	0.593	0.498	0.542	0.560
Adj. R^2	0.334	0.391	0.391	0.399	0.395	0.440	0.344	0.376	0.388

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The disaggregation of aid into the two categories suggests that, without considering any effects from the symptoms of state fragility, there is no significant effect of bilateral aid, whereas multilateral aid entails a negative and significant effect in two of the periods considered. The results also suggest that both bilateral aid and multilateral aid are less effective in countries with high levels of state ineffectiveness when considering periods 1993-2012 and 2003-2012. Furthermore, this result survives the inclusion of the triple interaction term between aid the two symptoms of fragility. The sign and significance level of the coefficient for aid x political violence changes depending on the period considered and on whether the triple interaction term is included. Regarding the effect of the latter, one finds a negative and significant effect when bilateral aid (independent of the period used), and in two of the periods when multilateral aid is used.

The same analysis is held for the case of panel data. The obtained coefficients are represented in Table 75, with Results A corresponding to bilateral aid and Results B to multilateral aid. With the exception of coefficients for the triple interaction term, the results are roughly in line with those obtained for the cross-country data.

Table 75. Panel OLS estimations with bilateral and multilateral aid

Results A: Bilateral aid

	Dependent variable: real GDP per capita growth					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Bilateral aid/GDP	-0.104	-0.0120	0.0217	-0.155**	-0.0206	-0.0113
	(0.0826)	(0.0919)	(0.107)	(0.0592)	(0.0644)	(0.0752)
Bilateral aid x SI		-0.0743	-0.0794		-0.0779**	-0.0769**
		(0.0454)	(0.0496)		(0.0312)	(0.0312)
Bilateral aid x PV		-0.0340	0.0212		0.0113	0.0241
		(0.0598)	(0.0749)		(0.0281)	(0.0449)
Bilateral aid x SI x PV			-0.0367			-0.00541
			(0.0472)			(0.0171)
Observations	179	179	179	132	132	132
R^2	0.404	0.420	0.425	0.474	0.497	0.498
Adj. R^2	0.341	0.351	0.353	0.401	0.417	0.413

Results B: Multilateral aid

	Dependent variable: real GDP per capita growth					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Multilateral aid /GDP	-0.354**	-0.0518	0.000862	-0.312***	0.0160	0.0313
	(0.168)	(0.183)	(0.182)	(0.0827)	(0.101)	(0.0965)
Multilateral aid x SI		-0.137	-0.123		-0.187***	-0.162**
		(0.109)	(0.102)		(0.0633)	(0.0646)
Multilateral aid x PV		-0.0174	0.0764		0.0366	0.144**
		(0.0582)	(0.102)		(0.0468)	(0.0724)
Multilateral aid x SI x PV			-0.0443			-0.0480
			(0.0402)			(0.0307)
Observations	179	179	179	132	132	132
R^2	0.436	0.456	0.461	0.504	0.539	0.551
Adj. R^2	0.377	0.391	0.393	0.435	0.466	0.475

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In a nutshell, the disintegration of aid into bilateral and multilateral aid is in line with the conclusion that aid may be less effective in countries where the performance of the state is lower in terms of its effectiveness. In line with the previous section, one fails to find a significant effect for either the interaction of aid and political violence or the triple interaction. Even though the cross-country evidence now lends some support to the idea that, despite being small in magnitude, there might be an interactive effect between aid

– independent of its origin – and the two symptoms of state fragility, the evidence from panel data does not concur with this.[158]

Moving now to the results obtained using Clemens et al.'s (2004a, b; 2012) categorisation of aid, the main coefficients of interest are represented in Table 76. These authors distinguish between: a) early-impact aid, which could be reasonably expected to have a causal effect on growth over a four-year period (e.g. budget support, investment in infrastructure); b) late-impact aid, which, if having an impact on growth, it will be over a long period of time (e.g. democratic support, investment in health and education); and, finally, c) emergency and humanitarian aid. Although in their work Clemens et al. (2012) focus on the first effect, given the time horizons considered in this chapter, I discuss the results obtained with the three different categories. In line with their approach, I add ODA repayments to the list of control variables.[159]

If early-impact aid is expected to have an impact on growth within the first four years, one may fail to observe this short-term effect with the time horizons considered. In fact, the coefficients in columns (1), (4) and (7) in Table 76, Results A, suggest that there is no significant effect of aid on economic growth. However, the same holds for late-impact aid (Results B) and humanitarian aid (Results C), whose coefficients see changes in sign when different time periods are considered, and are not significant in most specifications. Additionally, the inclusion of the interaction terms leads to changes in the sign and significance of the coefficient for aid, in all the types of aid used.

Looking now at the interaction terms, at face value the effect of aid seems to depend on the level of state ineffectiveness in the country. There is evidence of a negative and significant effect (independent of the type of aid considered) in the period 1993-2012. However, this result is not robust to using a different time horizon. In the case of the interaction between aid and political violence, the sign of the coefficient for political violence varies depending on the specification considered, and it is rarely significant.

[158] The same procedure followed previously to build an instrument for fitted aid was employed to obtain an instrument for each bilateral and multilateral aid. The results are included in Appendix D3, Table D3.2, and show a loss in the significance level of the coefficients for all the interaction terms. However, the tests for instrumental weakness do not support the use of this instrument and the explanatory power of the models is very low when the interaction terms are included.

[159] According to Clemens et al. (2012: 599), any flow of aid disaggregated by purpose, by definition, is not a net flow, given that repayments on aid are not divided by purpose. Thus, in order for the results obtained for different categories of aid to be comparable with those derived with total net aid, gross repayments must be included as a covariate. On the basis of this is the assumption that repayments on aid can affect growth, which is corroborated by the significant coefficient obtained for this variable in most regressions.

Table 76. Cross-country OLS estimations with early-impact, late-impact, and humanitarian aid, 1993-2012

Results A: Early-impact aid

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Early-imp. aid/GDP	-0.104	0.155	0.219*	0.0459	0.103	-0.0273	-0.121	0.147	0.303
	(0.141)	(0.101)	(0.121)	(0.146)	(0.206)	(0.225)	(0.141)	(0.159)	(0.189)
Early-imp. aid x SI		-0.129**	-0.132**		-0.0416	0.0448		-0.116	-0.132
		(0.0559)	(0.0574)		(0.0871)	(0.106)		(0.0796)	(0.0833)
Early-imp. aid x PV		-0.0480	0.0418		-0.00527	0.130		0.0168	0.183
		(0.0450)	(0.0648)		(0.0670)	(0.128)		(0.0612)	(0.113)
Early aid x SI x PV			-0.0364			-0.0897			-0.0459
			(0.0236)			(0.0691)			(0.0285)
Observations	73	73	73	63	63	63	57	57	57
R^2	0.557	0.642	0.653	0.520	0.522	0.540	0.549	0.589	0.609
Adj. R^2	0.431	0.523	0.529	0.353	0.327	0.337	0.368	0.394	0.408

Results B: Late-impact aid

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Late-imp. aid /GDP	-0.120	0.0628	0.0867	-0.121	0.155	0.147	0.0916	0.162*	0.173
	(0.123)	(0.0921)	(0.126)	(0.139)	(0.176)	(0.168)	(0.100)	(0.0927)	(0.103)
Late-imp. aid x SI		-0.123***	-0.127***		-0.156**	-0.132*		-0.118	-0.124
		(0.0410)	(0.0460)		(0.0612)	(0.0672)		(0.0866)	(0.0830)
Late-imp. aid x PV		-0.0184	0.00988		-0.0384	0.163*		0.0425	0.121*
		(0.0389)	(0.0827)		(0.0588)	(0.0843)		(0.0548)	(0.0716)
Late aid x SI x PV			-0.0156			-0.106***			-0.0420
			(0.0439)			(0.0378)			(0.0257)
Observations	73	73	73	63	63	63	57	57	57
R^2	0.560	0.633	0.635	0.525	0.575	0.625	0.545	0.569	0.586
Adj. R^2	0.435	0.511	0.504	0.359	0.401	0.460	0.363	0.364	0.374

Results C: Humanitarian aid

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Human. aid /GDP	-0.287	0.427	0.412	-0.469**	0.823	-0.132	0.268	1.780**	1.477*
	(0.189)	(0.389)	(0.458)	(0.211)	(0.999)	(1.010)	(0.527)	(0.764)	(0.803)
Human. aid x SI		-0.292*	-0.293*		-0.496	-0.256		-1.234**	-0.947
		(0.158)	(0.151)		(0.409)	(0.390)		(0.567)	(0.659)
Human. aid x PV		-0.00994	-0.0397		-0.00580	0.852*		0.517	0.652
		(0.107)	(0.312)		(0.203)	(0.463)		(0.476)	(0.484)
Human. aid x SI x PV			0.0144			-0.276*			-0.0993
			(0.140)			(0.142)			(0.0847)
Observations	73	73	73	63	63	63	57	57	57
R^2	0.565	0.599	0.599	0.554	0.576	0.606	0.542	0.610	0.617
Adj. R^2	0.441	0.466	0.456	0.399	0.403	0.432	0.359	0.425	0.420

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, the interaction between the latter two variables, and ODA loan repayments. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Finally, the coefficient for the triple interaction term holds a negative sign in almost all specifications considered, independent of the type of aid and the time period used (with the exception of the results for humanitarian aid in period 1993-2012). Still, it is significant in only two specifications, which does not suggest much support to the hypothesis of aid being even less effective when both levels of state ineffectiveness and political violence are high.

Table 77 represents the coefficients obtained when the same analysis was repeated for the two panel datasets. Overall, the results indicate that using this data structure does not seem to influence the main conclusions that can be drawn.

Table 77. Panel OLS estimations with early-impact, late-impact, and humanitarian aid, 1993-2012

Results A: Early-impact aid

	Dependent variable: real GDP per capita growth					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Early-impact aid/GDP	-0.108	0.0270	0.0335	-0.108	0.123	0.117
	(0.0893)	(0.128)	(0.115)	(0.0770)	(0.0946)	(0.0996)
Early-impact aid x SI		-0.115	-0.0939		-0.137***	-0.140***
		(0.0760)	(0.0673)		(0.0463)	(0.0456)
Early-impact aid x PV		-0.0244	0.0799		0.0541	0.0405
		(0.0532)	(0.0887)		(0.0370)	(0.0618)
Early-impact aid x SI x PV			-0.0622			0.00499
			(0.0474)			(0.0167)
Observations	160	160	160	120	120	120
R^2	0.451	0.467	0.476	0.518	0.541	0.542
Adj. R^2	0.381	0.390	0.396	0.438	0.454	0.449

Results B: Late-impact aid

	Dependent variable: real GDP per capita growth					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Late-impact aid /GDP	-0.0523	0.169*	0.198*	-0.159**	0.0419	0.0730
	(0.0757)	(0.0947)	(0.108)	(0.0740)	(0.0689)	(0.0760)
Late-impact aid x SI		-0.152***	-0.162***		-0.148***	-0.147***
		(0.0456)	(0.0508)		(0.0345)	(0.0350)
Late-impact aid x PV		0.0279	0.0861		0.0110	0.0990*
		(0.0288)	(0.0672)		(0.0403)	(0.0536)
Late-impact aid x SI x PV			-0.0433			-0.0469*
			(0.0492)			(0.0269)
Observations	160	160	160	120	120	120
R^2	0.446	0.475	0.480	0.526	0.573	0.588
Adj. R^2	0.375	0.400	0.401	0.447	0.492	0.505

Results C: Humanitarian aid

	Dependent variable: real GDP per capita growth					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Humanitarian aid /GDP	-0.264	0.496	0.482	-0.418**	1.314**	0.735*
	(0.276)	(0.671)	(0.692)	(0.171)	(0.536)	(0.429)
Humanitarian aid x SI		-0.616*	-0.609*		-0.777***	-0.605***
		(0.353)	(0.363)		(0.235)	(0.222)
Humanitarian aid x PV		0.270	0.321		0.0901	0.593**
		(0.194)	(0.306)		(0.198)	(0.296)
Humanitarian aid x SI x PV			-0.0182			-0.174**
			(0.0967)			(0.0854)
Observations	160	160	160	120	120	120
R^2	0.447	0.460	0.460	0.541	0.590	0.608
Adj. R^2	0.377	0.382	0.378	0.465	0.512	0.529

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, the interaction between the latter two variables, and ODA loan repayments. Cluster robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

While when 5-year averaged data are used, one finds no significant effect for any of the types of aid considered, late-impact aid and humanitarian aid are negative and significant when 10-year averages are used. The coefficients estimated for the interaction between aid and state ineffectiveness are now negative and significant in almost all specifications, even when different time periods are considered. There is again no evidence that there may be an interactive effect between aid and political violence. Finally, the results for the triple interaction show a negative effect in almost all regressions, but it is significant in only two of them.

In sum, the results in this section concur with the line of argument that fails to find a robust significant effect of development assistance on growth, even when considering different categories of aid flows. The evidence suggests that the level of state ineffectiveness in a country may negatively affect the impact of aid, even though this result is not robust to considering different time periods. Once again, it is not possible to observe a significant effect of political violence on aid effectiveness. Finally, and in line with the results in the previous section, in general one finds no significant effect for the triple interaction term.[160]

c) Alternative approaches to overcoming endogeneity

As described in section 5.4.4, the task of finding an appropriate instrument for aid has proven notoriously difficult. In order to address the doubts raised before about Rajan and Subramanian's (2008) proposal, in this section I explore the results obtained with two alternative approaches (described in detail in section 5.4.4.c). Results A in Table 78 were obtained by using a modified version of Rajan and Subramanian's (2008) fitted aid, as suggested in Arndt, Jones and Tarp (2010)[161], whereas Results B in the same table correspond to the coefficients derived from applying the set of exogenous instruments selected by Lessmann and Markwardt (2012), namely, a Franc zone dummy, a Central America dummy, the log of population, lagged aid, distance from equator, the share of population speaking a primary European language (English, French, German,

[160] Similarly to before, an instrument for each early-impact, late-impact and humanitarian aid was obtained following the same procedure as before. The results are included in Appendix D3, Table D3.3, for completion, but they were not considered in the analysis given that the tests for instrumental weakness and for overall fit of the model raise serious concerns about their validity.

[161] As a reminder, Arndt, Jones and Tarp (2010) use a specification similar to equation (6) to obtain fitted aid, but: a) treat missing values of aid as zeros; b) use aid per capita as a dependent variable; c) the independent variables are dummies for whether the country is a current colony of the donor, whether it was ever a colony, commonality of language, the ratio of the logarithm of the populations of donor and recipient, and the interactions between the latter two variables; d) add donor-specific fixed effects.

Table 78. Cross-country IV estimations with alternative approaches, 1993-2012

Results A: Arndt, Jones and Tarp's (2010) instrument

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aid/GDP	-0.251**	0.126	0.219	-0.220	0.413	0.585	-0.524	-0.193	-0.143
	(0.125)	(0.304)	(0.314)	(0.152)	(1.160)	(2.421)	(0.643)	(1.008)	(1.025)
Aid x SI		-0.240	-0.193		-0.516	-0.830		1.186	1.202
		(0.167)	(0.243)		(0.896)	(2.700)		(2.953)	(3.114)
Aid x PV		0.0494	0.194		0.129	-0.0508		-0.886	-0.799
		(0.0723)	(0.294)		(0.274)	(1.090)		(2.185)	(2.035)
Aid x SI x PV			-0.116			0.136			-0.0503
			(0.243)			(0.812)			(0.195)
Observations	77	77	77	67	67	67	65	65	65
R^2	0.375	0.048	-0.219	0.508	-0.810	-3.270	-0.009	-11.285	-11.708
p-value LM stat[a]	0.00521	0.101	0.547	0.00169	0.492	0.740	0.216	0.675	0.690
F-stat weak id.	10.68	0.702	0.0697	10.50	0.119	0.0204	1.199	0.0381	0.0254

Results B: Lessmann and Markwardt's (2012) proposal

	Dependent variable: real GDP per capita growth								
	20-year			10-year					
	1993-2012			1993-2002			2003-2012		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aid/GDP	-0.197**	-0.196*	-0.0981	-0.192**	-0.185*	-0.0816	0.0306	0.0995	0.0797
	(0.0916)	(0.112)	(0.111)	(0.0925)	(0.107)	(0.0847)	(0.0791)	(0.0798)	(0.0749)
Aid x SI		-0.0233	-0.0329		-0.0231	0.0231		-0.0537	-0.0265
		(0.0377)	(0.0365)		(0.0436)	(0.0423)		(0.0343)	(0.0298)
Aid x PV		0.0317	0.125**		-0.00524	0.124***		0.0244	0.0994**
		(0.0283)	(0.0506)		(0.0254)	(0.0364)		(0.0346)	(0.0449)
Aid x SI x PV			-0.0512**			-0.0673***			-0.0273***
			(0.0242)			(0.0160)			(0.0105)
Observations	73	73	73	65	65	65	62	62	62
R^2	0.452	0.447	0.476	0.514	0.513	0.556	0.407	0.434	0.466
p-value	0.158	0.304	0.460	0.345	0.336	0.454	0.00767	0.0126	0.0267
p-value LM stat[a]	0.0638	0.143	0.0897	0.0246	0.0832	0.0702	0.0157	0.0360	0.510
F-stat weak id.	1.910	1.918	2.513	2.486	3.703	3.019	9.591	3.551	0.858

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

Portuguese, and Spanish), a dummy for countries with a federal constitution, the country size, and the interaction between the last two variables.[162]

In general, in comparison to Arndt, Jones and Tarp's (2010) fitted aid, one notices that the specifications obtained by using Lessmann and Markwardt's instrumentation strategy show better results in the tests for instrument strength when the regressions with interaction terms are considered. However, both proposals fail to pass the tests of instrumentation weakness in the majority of regressions. Additionally, the explanatory power of the models is very weak when Arndt, Jones and Tarp's (2010) proposal is used, and especially for the 10-year period 2003-2012.

[162] Despite being used by these authors, arms imports is not considered in the analysis due to data availability, and the fact that this variable is not significant in any of the first-stage regressions in Lessmann and Markwardt (2012: 1729-1730).

Given these concerns, I will briefly discuss the obtained results, but these should be regarded with caution. Looking at the coefficient for aid before any interactions are considered, the weight of the evidence is toward a negative effect, which is significant for period 1993-2012, independent of the instrumentation strategy used. Results A do not lend support to any significant effect of neither state ineffectiveness nor political violence on the impact of aid on growth. Results B show that political violence has a significant positive effect on aid effectiveness, but only when the interaction between these two variables and state ineffectiveness is considered. With regards to the latter, the coefficient holds a negative and significant effect in the three time periods considered when Lessmann and Markwardt's (2012) proposal is followed.

Similarly to before, I repeat the analysis for the two panel datasets. The results for the main coefficients of interest are included in Table 79.

Table 79. Panel IV estimations with alternative approaches, 1993-2012

Results A: Arndt, Jones and Tarp's (2010) instrument

	Dependent variable: real GDP per capita growth					
	1993-2012					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Aid/GDP	-0.373	-0.303	0.0973	-0.246*	-0.00439	-0.0324
	(0.235)	(0.983)	(0.782)	(0.132)	(0.397)	(0.623)
Aid x SI		-0.832	-0.470		-0.435	-0.658
		(1.708)	(0.600)		(0.415)	(0.873)
Aid x PV		0.434	0.449		0.219	-0.169
		(1.014)	(0.683)		(0.234)	(0.542)
Aid x SI x PV			-0.147			0.242
			(0.274)			(0.412)
Observations	179	179	179	132	132	132
R^2	0.335	-4.169	-0.936	0.451	-0.845	-4.281
p-value of LM stat[a]	0.00601	0.612	0.339	0.00239	0.235	0.486
F-stat for weak ident.	8.068	0.0758	0.213	10.52	0.387	0.109

Results B: Lessmann and Markwardt's (2012) proposal

	Dependent variable: real GDP per capita growth					
	1993-2012					
	5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)
Aid/GDP	-0.0928	-0.0632	-0.0451	-0.162**	-0.0914	-0.0590
	(0.0608)	(0.0716)	(0.0701)	(0.0734)	(0.0760)	(0.0724)
Aid x SI		-0.0330	-0.0204		-0.0582**	-0.0473*
		(0.0410)	(0.0369)		(0.0295)	(0.0279)
Aid x PV		0.00136	0.0501		0.00826	0.0839**
		(0.0280)	(0.0424)		(0.0242)	(0.0380)
Aid x SI x PV			-0.0268			-0.0381**
			(0.0185)			(0.0171)
Observations	174	174	174	127	127	127
R^2	0.420	0.434	0.447	0.452	0.447	0.387
p-value	0.186	0.159	0.182	0.0175	0.0735	0.245
p-value of LM stat[a]	0.00965	0.00571	0.00584	0.0104	0.0122	0.0597
F-stat for weak ident.	15.91	3.892	3.827	5.260	2.640	4.860

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

In terms of instrumentation strength, again Lessmann and Markwardt's (2012) proposal proves more adequate. This is more evident when the interaction terms are included in the regressions, as seen by the negative values for the R^2 obtained in columns (2), (3), (5), and (6) of Results A.

I discuss the obtained coefficients with the same reservations as before. The coefficient for aid in the baseline regressions shows a negative and significant effect of this variable on growth, but only when the 10-year averaged data are used. In line with the cross-country results, one finds no indication of an interactive effect between aid and any of the symptoms of state fragility when Arndt, Jones and Tarp's (2010) instrument is employed. The same applies for the results obtained with the 5-year averaged datasets and the set of instruments proposed by Lessmann and Markwardt (2012). However, the coefficients obtained with the same instrumentation strategy for the 10-year averaged data are similar to those obtained for the cross-country data, the main difference being the negative and significant coefficient for aid x state ineffectiveness.[163]

d) Summary of results

The main results of this section are compiled in Table 80. Firstly, when the outliers were removed, one observed a few changes when comparing with the results with the full dataset. Yet, the conclusions remain similar. There is some evidence of a negative sign of the effect of aid on growth when one uses OLS methods, but the significance level drops when IV methods are employed. The interactive effect between this variable and state ineffectiveness also appears negative and significant in some of the regressions estimated with OLS and IV, but the significance level depends on the period considered. The results for the term aid x political violence show a positive sign, but the coefficient is not significant in most specifications. Finally, there is also no support for an interactive effect between aid and the two symptoms of fragility.

Allowing for the differentiated effects for different types of aid suggested that the negative effect of aid on growth is more visible when aid is disaggregated. However, this effect was only significant in most cases when multilateral aid was considered. The most

[163] Arndt, Jones and Tarp's (2010: 11-12) remark about the fact that missing bilateral aid flows should be set as zeros was taken into account when calculating fitted aid, but not when obtaining the value for total aid. However, the same analysis was repeated considering the missing values as zeros also when calculating total aid/GDP. This change did not influence the results obtained for the variables of interest.

Table 80. Summary of results from robustness checks

	Outliers	
	OLS	IV
Aid*	Negative and significant coefficient in most regressions.	Negative term in all specifications, but significance level drops depending on the time period and data specification considered.
Aid x SI	Negative coefficient, significant in a few regressions, namely with cross-country for periods 1993-2012 and 2003-2012, and for two regressions with panel data (10-year averages).	Negative coefficient in all specifications, but significant only for period 1993-2012 and in one specification for panel data.
Aid x PV	Positive term in most specifications, but significant in only two of them when cross-country data are used.	Variation in the sign of the estimated coefficient, which is not significant in any of the regressions.
Aid x SI x PV	Negative and significant coefficient with cross-country data, but the sign changes and it is not significant with panel data.	The sign of the term varies and it is not significant in any of the regressions estimated.
	Disaggregation of aid	
	Bilateral vs. multilateral aid	Early-impact, late-impact and humanitarian aid
Aid*	Bilateral aid has a negative coefficient in most specifications, but it is significant in only one of them. Multilateral aid shows a negative and significant effect in most regressions.	Most of the obtained coefficients are not significant, and this disaggregation of aid into categories does not seem to lead to differences in the obtained results.
Aid x SI	With the exception of period 1993-2002 and panel data with 5-year averages, the coefficient is negative and significant in all specifications for both bilateral and multilateral aid.	With the exception of the results for two of the periods considered, there is no indication of a significant result for early-impact aid. Negative and significant term for most specifications when late-impact aid and humanitarian aid are used.
Aid x PV	Mostly positive term, but the sign and significance level vary across the specifications for both types of aid.	Sign varies depending mainly on the time period considered and on whether the triple interaction term is included, but it is not significant in most specifications.
Aid x SI x PV	Negative and significant coefficient for both categories of aid when cross-country data are used, but it loses significance for panel data.	The coefficient is negative in most specifications, but significant in only some of them.
	Different strategies to overcoming endogeneity	
	Arndt, Jones and Tarp's (2010) approach	Lessmann and Markwardt's (2012) approach
Aid*	Negative term, but significant in only two of the regressions estimated.	The weight of the evidence suggests a negative and significant effect.
Aid x SI	Negative in most specifications, but it is non-significant in all regressions.	Negative sign in most specifications, but the coefficient is significant only with 10-year averaged panel data.
Aid x PV	Sign varies depending on the time periods used, but the term is never significant.	Positive term, which is significant only when the triple interaction term is included.
Aid x SI x PV	Sign varies depending on the time periods considered, but the term is non-significant in all regressions.	Negative and significant effect in most of the estimated regressions.

Notes: *Aid refers to the coefficient for aid in the baseline estimations, i.e. before any interaction terms between this variable and the indicators of state fragility are included.

noticeable difference in comparison with the results obtained when using total aid is that the negative and significant effect of the interaction with state ineffectiveness is now more robust across specifications. With the exception of early-impact aid, one finds that aid appears to be less effective in countries with high levels of state ineffectiveness. Even when disaggregating aid into different categories, one fails to find a significant effect for the interaction between aid and political violence, and for the triple interaction term.

Finally, the use of alternative instrumentation approaches did not lead to great improvements in terms of instrument strength, and the obtained results are not at odds with the ones presented before. The following section discusses these results in relation to those obtained previously and compares them with the insights from existing literature.

5.6. DISCUSSION OF THE RESULTS

This chapter has revisited the evidence on aid effectiveness by exploring whether its effect on economic growth depends on the level of state ineffectiveness and/or political violence. Table 81 encapsulates the main conclusions from using different datasets, different estimation methods, and allowing for further changes in the specifications. Each column shows the variation in the obtained estimates for the four coefficients of interest.

The results represented in the column for 'Aid', obtained without considering any interactive effects, echo the longstanding disagreement that characterises the aid effectiveness literature. The coefficient is negative in several specifications, but there is some variation in both sign and significance level depending on the time period, time horizon, method, and sample of countries considered. Similarly, allowing for diverse effects depending on the aid category did not suggest that we find significantly dissimilar results when considering different types of aid. If anything, the results vary more when one distinguishes aid flows by channel (bilateral vs. multilateral) rather than the timing of their effect.

The second column of Table 81 suggests that there seems to be a negative interactive effect between aid and state ineffectiveness, which, according to the theoretical predictions, could mean that aid is less effective in countries with higher levels of state ineffectiveness. However, the coefficient is only significant in a few of the specifications considered, and mostly when one distinguishes between different categories of aid. The results for the interaction between aid and political violence show a positive sign in some of the specifications considered, but there is some variation, and the lack of significance of the coefficient points to the existence of no interactive effect between these variables.

Table 81. Review of the empirical results

	Aid[1]	Aid x SI	Aid x PV	Aid x SI x PV
	BASELINE RESULTS			
	Cross-country data			
OLS	The **sign and significance level vary** depending on the time period considered.	**Negative** sign in all specifications, but the coefficient is **significant only** for periods 1993-2012 and 2003-2012.	**Positive** effect in most specifications, but it is **never significant**, with the exception of one specification.	**Negative** sign in all specifications. The coefficient is **significant only** for periods 1993-2012 and 2003-2012.
IV	**Negative** sign in all specifications, but the coefficient is **significant only** when the original dataset is used.	**Negative** term in all specifications, but it is **not significant** in most of them.	**Positive** sign in most specifications, but the coefficient is **never significant**.	The sign of the coefficient **varies** depending on the period considered, but it **never** shows a **significant** effect.
	Panel data			
OLS[2]	**Negative** coefficient, but **significant only** with 10-year averages.	**Negative** coefficient, but **significant only** with 10-year averages.	**Positive** sign in most specifications, but the coefficient is **never significant**.	**Negative** coefficient, but it is **never significant**.
IV	**Negative** coefficient, but **significant only** with 10-year averages.	**Negative** coefficient, but **significant only** in one specification.	**Positive** sign in most specifications, but the coefficient is **never significant**.	The sign of the coefficient **varies**, but it is **never significant**.
	ROBUSTNESS CHECKS			
Outliers excluded[3]	**Negative** and **significant** coefficient in most regressions.	**Negative** coefficient, but **significant only** in a few regressions.	**Positive** term in most specifications, but **significant only** in two of them.	The **sign** and **significance** level of the coefficient **vary** depending on the data structure considered.
Aid categories[4]	**Negative** sign independent of the type of aid considered, but **significant only** for multilateral aid.	**Negative** and **significant** in most specifications, with the exception of early-impact aid.	**Sign** and **significance** level **vary** across the specifications considered.	There is some evidence of a **negative** and significant effect, but this result **changes** across specifications.
Alternative IV[5]	The weight of the evidence suggests a **negative** and **significant** effect mainly when Lessmann and Markwardt's (2012) instruments are used.	**Negative** sign in most specifications, but the coefficient is **not significant** in most of them.	**Positive** in most specifications, but the **sign** and **significance** level **vary** across specifications.	**Negative** sign in most specifications, but the coefficient is **significant only** when Lessmann and Markwardt's (2012) instruments are used.

Notes: [1]This column refers to the results obtained for the coefficient of aid in the baseline regressions, i.e. before any interaction terms were included. [2]These results do not include the FE estimates. [3]These results refer to OLS estimates. When IV methods were used, overall there were no dramatic changes in the sign of the coefficients, but there was an overall loss of significance. [4]This refers to the differentiation between bilateral and multilateral aid, and between the different categories proposed by Clemens et al. (2012). [5]This refers to the application of the instrumentation strategies suggested in Arndt, Jones, and Tarp (2010) and in Lessmann and Markwardt (2012).

Finally, even if significant in some of the regressions considered, the estimated coefficient for the interaction between aid, state ineffectiveness and political violence sees a lot of variation in sign and it loses significance when one considers different time periods and uses different estimation methods.

These results can be compared with the insights provided by the different strands of literature reviewed in section 5.2. I will start with a brief note on the comparison with the results obtained in studies using the CPIA to understand whether aid is less effective in countries with lower scores. Given that the dimensions captured by the CPIA are similar to some of those used in the construction state ineffectiveness index[164], I will focus on this variable. The negative and significant interactive effect between aid and the index of state ineffectiveness concurs to the line of argument in the aforementioned literature. However, as portrayed in Table 81, this result is not robust to using different time periods and different estimations methods.

I focus now on the studies explicitly looking at the impact of aid in fragile states. Starting with McGillivray and Feeny (2008), they found no evidence that fragility per se matters for aid effectiveness. The results in this chapter are in line with this claim.

However, the conclusions from the analysis presented here are slightly at odds with those obtained by Carment, Samy and Prest (2008). I recall that these authors find a positive and significant coefficient for aid, and its magnitude increases when considering samples of countries restricted to more fragile states (i.e. scoring higher in their measure of state fragility), thus suggesting that aid has a larger effect on growth in more fragile countries, *ceteris paribus*. Still, the estimated coefficient for the interaction between aid and fragility shows a negative and significant effect in all specifications, which also sees an increase in magnitude when the restricted sample of countries is used.

Finally, I refer back to the working paper by Andrimihaja, Cinyabuguma and Devarajan (2011). I focus here on their results for the overall sample of countries, as this chapter does not consider how the effects of fragility may differ depending on the region considered. Similarly to the conclusion drawn from the estimations in this chapter, the authors fail to find a significant effect of state fragility on the impact of aid on growth. The initial calculations used dummies for fragile and non-fragile countries, as well as African fragile and non-fragile countries, and the obtained coefficient for aid*dummy fragile states was positive but non-significant. Additionally, its inclusion did not cause any changes to the positive and significant coefficient estimated for aid.

[164] Considering the data available for the CPIA index, the correlation between this variable and the state ineffectiveness index for period 2005-2012 is -0.7139.

5.7. CONCLUSION

The main goal of this chapter was simple: to examine whether the evidence concurs to the view derived from the aid effectiveness literature that aid is less effective in promoting growth in fragile states, when considering a multidimensional approach to state fragility. This goal was pursued by analysing the results obtained after adding two interaction terms between aid and both an index of state ineffectiveness and another for political violence to a standard growth regression.

Overall, the results do not suggest that there is any significant effect of either state ineffectiveness or political violence on the impact of aid on growth. There is wide variation in the size, magnitude and coefficient of the two variables of interest depending on the specifications considered. Additionally, I also failed to find a significant indication that the effects of these two variables on aid effectiveness interact with one another. These conclusions were drawn after considering different time periods and horizons, data structures, estimation techniques, samples of countries, and aid categories.

These findings contribute to two strands of literature. The main contribution of this chapter is towards the empirical literature on the impact of aid in fragile states. Given the relative scarcity and the limitations of the empirical work explicitly examining this relationship, the results presented here fill in a gap in knowledge by providing a thorough examination of the relationship between state fragility, aid, and economic growth using different data specifications and estimation techniques.

Although modest, the secondary contribution is towards the already large body of studies testing the aid-growth nexus. In line with Temple (2010) and others (e.g. Arndt, Jones and Tarp, 2010), this chapter used as a starting point Rajan and Subramanian's (2008) study. By using a dataset that attempted to, as far as possible, replicate the original dataset in their paper, the results presented here also serve as robustness check to their work. The conclusions drawn are in line with their overall claim that there is little evidence suggesting a robust positive correlation between aid and growth, holding everything else constant. I reach a similar conclusion when introducing additional covariates, and varying the empirical specifications.

At face value, the results obtained for the coefficient of aid before introducing any interaction effects do not seem very optimistic. Yet, this claim should be regarded with care. First, as suggested in Rajan and Subramanian (2008), it may be that the noise in the data is precluding one to establish the relationship between the variables of interest and growth. This is not the case in their study, they argue, but it is a possibility for some of the estimations in this chapter, especially when using IV methods.

I acknowledge this as a limitation in the present analysis. In most of the model specifications considered, especially when using cross-country data, the regression models show a good explanatory power (between around 30% and 60%). However, the majority of the coefficients were not significant, which indicates that the model failed to distinguish between the effects of different growth determinants. One explanation for this is the limited sample size, due in particular to the lack of data availability for the two fragility indices, which results, in turn, from the limitations in the data available for the indicators used to build them.

Still, the first of the aforementioned contributions has important implications for the allocation of aid to fragile states. If there is no evidence that, on average, aid will be less effective in fragile states, then the fears implicit in the aforementioned conundrum that aid will be squandered in these countries can be eased. However, it also highlights a limitation of this analysis, as development entails more than economic growth. The examination of the links between state fragility, aid, and other development outcomes (e.g. poverty reduction) is suggested as the object of future work.

Two other extensions of this chapter follow naturally from the analysis. The first is suggested by the study by Andrimihaja, Cinyabuguma and Devarajan (2011) and consists in examining whether the effects change when distinguishing between different samples of countries depending on their regions. Finally, as suggested in Figure 18 (in Section 5.3), there may be potential indirect effects of aid on growth, for instance, through the promotion of state effectiveness or political violence. I propose the examination of these links as another avenue for further research.

CHAPTER 6. CONCLUSION

The concept of state fragility is one that has proved extremely resonant in the policy discourse of development organisations over the last decade. Despite the profusion of – and lack of agreement in – the definitions used, this ubiquitous term is usually employed to describe situations in which the state lacks the capacity and/or willingness to fulfil what are perceived to be its core functions. According to these accounts, fragile states show a lagging performance in the achievement of development goals, and, more specifically, in reducing their high levels of poverty. They not only bear higher internal economic and human costs, but also impose a threat to international security and economic stability. These characteristics have been used as reasons to justify assistance to these countries.

However, ensuring that development assistance is effective is particularly challenging in contexts where there is a deficiency in the performance of the state and/or high levels of political violence. According to a strand of the empirical literature examining the enduring question of aid effectiveness, the role of aid in promoting economic development is conditional on certain factors, namely the quality of institutions and the type of policies in the country, as well as the level of political violence. This is the quandary of development assistance to fragile states: it is perceived to be less effective in these countries, but they are also those in the greatest need.

This thesis has engaged with this dilemma by examining the nexus between state fragility, development aid and economic growth. It started by throwing some light on the definition and operationalisation of the concept of state fragility; it then explored the links between state fragility, economic growth and aid effectiveness through the use of quantitative analysis. The following paragraphs highlight the main contributions and suggest some avenues for further research.

The first part of this thesis engaged with the definition and measurement of state fragility, surveying the most commonly used conceptualisations and measures in order to identify the reasons behind the obscurity and murkiness of the term. In so doing, it unravelled a lack of theoretical grounding that undermines most of the existing approaches and found support to the claim that they muddle the distinction between causes and outcomes of state fragility. This is the first contribution of this thesis.

The second contribution of the thesis is that it suggests an alternative way of measuring the concept of state fragility. Against the backdrop set by the review of existing measures, the measurement approach proposed here does not make claims to be better in all aspects. Still, it is argued that it overcomes some of the criticisms that have been pointed to current measures of state fragility. More specifically, it is based on a sound theoretical framework, which establishes a normative standpoint for the role of the state and draws on Besley and Persson's (2011a) model of state fragility to derive the two core dimensions of fragility: state ineffectiveness and political violence. This distinction follows a recent call for the use of multidimensional approaches to unpack the complexity of the term. Additionally, it found support in the exploratory cluster analysis in Chapter 3, which reveals the existence of patterns of countries according to the two dimensions.

Furthermore, it helps make the concept of fragile states operational for further analysis by providing a continuous measure for both state ineffectiveness and political violence. This approach departs from previous studies adopting a dichotomous distinction between fragile and non-fragile states, and avoids the use of cut-off points which lack clear justification. The usefulness of this measurement approach is then demonstrated in two empirical exercises in Chapters 4 and 5.

Part II of this thesis responds to the challenge of understanding the links between state fragility, development aid and economic development. The review of the empirical literature on the fragility-growth link highlighted that, despite the multitude of studies exploring similar relationships, only a handful of studies explicitly engaged with the cross-country evidence on the effects of state fragility on growth. In particular, most of these accounts were based on the CPIA as a proxy measure of state fragility and none of them considered the effects of distinct dimensions of fragility. The third contribution of this thesis is filling this gap in the literature by providing an empirical examination of this link with the use of cross-country and panel data for different periods. The results concurred to the view that one should look at the two dimensions separately. Not only do we observe distinct effects for each of the two dimensions, but one also fails to find any significant impact of state fragility on growth when employing a single index (obtained with the same variables employed in the construction of the two indices).

The fourth contribution of the thesis is towards the empirical analysis of growth determinants and follows from the examination of the distinct effects of state ineffectiveness and political violence. Concerning the former, the results suggested that there is a negative and statistically significant effect of state ineffectiveness on economic growth, which is robust to excluding outliers, adding new control variables, and taking the potential endogeneity of the two dimensions of state fragility into account. This has important implications for development policy. The recently published World Development Report 2017 (World Bank, 2017a) argues that improving governance is essential to overcome the challenges currently faced by developing countries. This analysis finds support to this view and contributes to a better understanding of the link between two of these challenges – state ineffectiveness and political violence – and one of the development objectives identified – promoting prosperity. Regarding political violence, the variation in the sign and significance level observed for the coefficient across specifications suggests that the complexity of its link with growth requires further investigation.

The fifth and final contribution of the thesis is to add to our understanding of the effectiveness of aid in fragile states, and to whether donors really do face a quandary in these countries, due to higher levels of need but lower levels of effectiveness. Inspired in the tradition of cross-country studies on the impact of foreign aid on growth rates, Chapter 5 tested the proposition that aid is less effective in promoting growth in countries with higher levels of state ineffectiveness or with higher levels of political violence. The estimated coefficients for these interactions showed no evidence for any of these effects. To a certain degree, these results can help mitigate the concerns over aid towards these countries.

However, the lack of significance of the coefficient for aid when no interaction effects are considered can also be discouraging for the aid donors. A secondary contribution offered by the analysis in Chapter 5 of this thesis is that it tests the robustness of the conclusions drawn by Rajan and Subramanian's (2008) study. The results presented here are in line with those obtained by this study, as I fail to find evidence of a positive and significant correlation between aid and growth. Still, this should not be taken as evidence that this effect does not exist.

As pointed out by Rajan and Subramanian (2008), one explanation is that the background noise in the data prevents one from finding the effects predicted by theory, especially if they are small in magnitude. This is a possibility for some of the estimations presented in Chapter 5, and in particular when employing IV methods. As described in detail in that chapter, the instrumentation strategy pursued is not perfect, especially when considering interaction terms. I recognise this as a limitation of the analysis and suggest that future analysis with improved instrumentation techniques or alternative approaches to overcoming endogeneity could help to a better understanding of these relationships.

A further limitation of the empirical analyses in Chapters 4 and 5 is their temporal restriction. Given that the construction of the indices for state ineffectiveness and political violence uses indicators that are only available from mid-1990s, the time horizon for the analysis is rather limited. For instance, if the effects of aid are only discernible in the long-run (Arndt, Jones and Tarp, 2015b), then this can explain why one fails to find evidence of any effect in this analysis.

An additional gap in the empirical work in Chapters 4 and 5 is their exclusive focus on growth as the outcome of economic development. This simplification was useful for comparative purposes, as it allowed one to address the topic of state fragility within the empirical literature using cross-country growth regressions. Additionally, it is standard in the empirical literature that examining aid effectiveness equates to determining the effect of this variable on growth rates. Still, the exploration of the links between state fragility, aid, and other development outcomes, such as poverty reduction or the progress towards achieving other Sustainable Development Goals (SDGs) is suggested as another possible object of future work.

Three other avenues of research became apparent throughout the analysis in this thesis. Firstly, an interesting extension to Chapter 3 would be to investigate the causes of state fragility. This has been the object of study in other work (e.g. Bertocchi and Guerzoni, 2012; Kodila-Tedika and Simplice, 2016), but in terms of the operationalisation of the concept suggested here, it has only been partially examined in Besley and Persson (2011c).

Second, the analysis in Chapter 5 focused on the direct effects of aid on growth, but mentioned the existence of potential indirect effects through investments in state capacity and political violence. Even though I find no evidence of a direct effect of aid on growth, there might still be indirect effects which also depend on fragility. Thus, examining these links would further add to the understanding of the aid-fragility nexus.

Finally, and also drawing from the analysis in Chapter 5, I suggest that the robustness check performed with the disaggregation of aid into different categories could be further explored. Due to data limitations and for comparability purposes, the two categorisations of aid employed in the chapter did not follow Besley and Persson's (2011a) theoretical model. However, the hypotheses laid in their paper regarding the distinct effects of cash aid, technical assistance, military assistance, and post-conflict assistance are an interesting starting point for further empirical investigation.

The parallel between state fragility and the Anna Karenina principle described in Leo Tolstoy's 1880s novel has been drawn in several accounts (namely in Besley and Persson, 2011a), and the quote "All happy families resemble each other; every unhappy family is unhappy in its own way" is often used to illustrate the concept of fragile states. This thesis has thrown some further light on this point by highlighting the multidimensionality of fragility and by suggesting, as well as applying, an alternative way of operationalising the definition empirically. Moreover, even if the policy dilemma of development assistance remains unsolved, this thesis has taken some further steps towards unravelling the effects of aid towards countries with higher levels of state fragility.

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APPENDICES

APPENDIX A. APPENDICES TO CHAPTER 2

Appendix A1. Definitions of state fragility

Table A1.1. Definitions used by selected major institutions within the donor community

Institution	***Concept***	***Definition***
World Bank	Fragile states Fragile and conflict affected situations (FCS)	The World Bank adopted the term fragile states "in the interests of harmonization" (World Bank, 2005: 1) as corresponding to their definitions of Low Income Countries Under Stress (LICUS). "The Bank identifies fragile states by weak performance on the Country Policy and Institutional Assessment (CPIA). They share a common fragility, in two particular aspects: • State policies and institutions are weak in these countries: making them vulnerable in their capacity to deliver services to their citizens, to control corruption, or to provide for sufficient voice and accountability. • They face risks of conflict and political instability. (…)" (World Bank, 2005: 1). The CPIA considers 16 criteria, group in 4 clusters (economic management, structural policies, policies for social inclusion and equity, and public sector management and institutions) for rating countries on a scale from 1 to 6. A country is considered fragile if its score is equal to or below 3.2. Fragile situations are "[p]eriods when states or institutions lack the capacity, accountability, or legitimacy to mediate relations between citizen groups and between citizens and the state, making them vulnerable to violence." (World Bank, 2011b: xvi) "Fragile Situations" have: either a) a harmonized average CPIA country rating of 3.2 or less, or b) the presence of a UN and/or regional peace-keeping or peace-building mission during the past three years. (World Bank, 2017b)
Asian Development Bank	Weakly performing countries (WPCs)	"Many of the region's poor people live in DMCs [developing member countries] that have weak governance, ineffective public administration and rule of law, and civil unrest. These countries have been referred to variously as WPCs, fragile states, low-income countries under stress (LICUS), and difficult partnership countries. Service delivery systems in such countries seldom function well, and the government's ability to guarantee the basic security of its people is often limited. WPCs are more likely to experience large-scale and civil conflict than other low-income countries." (Asian Development Bank, 2007: 1) "While WPCs may exhibit aspects of fragility, the primary focus on weak performance is consistent with the performance-based allocation systems of ADB, African Development Bank, and the LICUS approach of the World Bank." (Asian Development Bank, 2007: 1)
African Development Bank	Fragile states	"Fragility is an imbalance between the strains and challenges (internal and external) faced by a state and society and their ability to manage them. At the extreme, fragility is expressed as conflict or collapse of state functions. (…) Fragility is thus the opposite side of the coin to state resilience, which is the ability of the state to manage such strains through effective institutions, processes and capacities that build legitimacy and societal cohesion." (African Development Bank, 2014: 2)
European Commission	Situations of fragility	"Fragility refers to weak or failing structures and to situations where the social contract is broken due to the State's incapacity or unwillingness to deal with its basic functions, meet its obligations and responsibilities regarding service delivery, management of resources, rule of law, equitable access to power, security and safety of the populace and protection and promotion of citizens' rights and freedoms." (European Commission, 2007: 5)
OECD	Fragile states	"A fragile region or state has weak capacity to carry out basic governance functions, and lacks the ability to develop mutually constructive relations with society. Fragile states are also more vulnerable to internal or external shocks such as economic crises or natural disasters. More resilient states exhibit the

Table A1.1. Definitions used by selected major institutions within the donor community

Institution	***Concept***	***Definition***
		capacity and legitimacy of governing a population and its territory. They can manage and adapt to changing social needs and expectations, shifts in elite and other political agreements, and growing institutional complexity. Fragility and resilience should be seen as shifting points along a spectrum." [OECD (2012a) in OECD (2012: 15)]
g7+	Fragile states	"A state of fragility can be understood as a period of time during nationhood when sustainable socio-economic development requires greater emphasis on complementary peacebuilding and statebuilding activities such as building inclusive political settlements, security, justice, jobs, good management of resources, and accountable and fair service delivery." (g7+, 2013: 1)
DFID	Fragile states	"Although most developing countries are fragile in some ways, DFID's working definition of fragile states covers those where the government cannot or will not deliver core functions to the majority of its people, including the poor. The most important functions of the state for poverty reduction are territorial control, safety and security, capacity to manage public resources, delivery of basic services, and the ability to protect and support the ways in which the poorest people sustain themselves. DFID does not limit its definition of fragile states to those affected by conflict." (DFID, 2005: 7) More recently, the expression Fragile and Conflict Affected States (FCAS) has also been used.
USAID	Fragile states	"USAID uses the term *fragile states* to refer generally to a broad range of failing, failed, and recovering states. However, the distinction among them is not always clear in practice, as fragile states rarely travel a predictable path of failure and recovery, and the labels may mask substate and regional conditions (insurgencies, factions, etc.) that may be important factors in conflict and fragility. It is more important to understand how far and quickly a country is moving from or toward stability than it is to categorize a state as failed or not. *Therefore, the strategy distinguishes between fragile states that are vulnerable from those that are already in crisis.* USAID is using *vulnerable* to refer to those states unable or unwilling to adequately assure the provision of security and basic services to significant portions of their populations and where the legitimacy of the government is in question. This includes states that are failing or recovering from crisis. USAID is using *crisis* to refer to those states where the central government does not exert effective control over its own territory or is unable or unwilling to assure the provision of vital services to significant parts of its territory, where legitimacy of the government is weak or nonexistent, and where violent conflict is a reality or a great risk." (USAID, 2005: 1)
Canadian International Development Agency (CIDA)	Fragile states	"According to CIFP's [Country Indicators for Foreign Policy] conceptualisation, the state is the primary unit of analysis and needs to exhibit the three fundamental properties of authority, legitimacy and capacity (ALC) to function properly (or to use the World Bank's language – security, justice and jobs). Fragility measures the extent to which the actual characteristics of a state differ from their ideal situation; states are constrained by both internal and external forces that are constantly changing over time. Consequently, all states are, to some extent, fragile; weakness in one or more of the ALC dimensions will negatively impact the fragility of a particular country. In that sense, we need to consider not only the extreme cases of failing, failed and collapsed states but also the ones that have the potential to fail." (Carment and Samy, 2012: 4)

Notes: See Box 1 in Cammack et al. (2006: 17) for a more comprehensive list of working definitions of fragile states used by donor organisations.

APPENDIX B. APPENDICES TO CHAPTER 3

Appendix B1. Data description

Table B1.1. List of definitions, measures and data sources for the variables used in the analysis

Symptom	Dimension	Proxy	Definition	Measure	Data source
State ineffectiveness	Contract enforcement	Rule of law	Captures perceptions of the extent to which agents have confidence in and abide by the rules in society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	The aggregate measure ranges from around -2.5 to 2.5, with higher values corresponding to better outcomes.	Worldwide Governance Indicators (World Bank, 2015a)
		Regulatory quality	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	The aggregate measure ranges from around -2.5 to 2.5, with higher values corresponding to better outcomes.	Worldwide Governance Indicators (World Bank, 2015a)
		Enforcing contracts	Measures the efficiency of the judicial system in resolving a commercial dispute.	Represents the number of days to resolve a commercial sale dispute through the courts (in calendar days).	Doing business (World Bank, 2015b)
		Independence of the judiciary	Captures the extent to which the judiciary is independent of control from other sources, such as another branch of the government or the military.	A score of 0 indicates 'not independent', 1 represents 'partially independent', while 2 indicates 'generally independent'.	CIRI (Cingranelli, Richards and Clay, 2014)
		Control of corruption	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	The aggregate measure ranges from around -2.5 to 2.5, with higher values corresponding to better outcomes.	Worldwide Governance Indicators (World Bank, 2015a)
	Protection of property	Property rights enforcement	Measures the extent to which a country's legal framework allows individuals to freely accumulate private property, secured by clear laws that are enforced effectively by the government.	The scale is formed by scores ranging from 0 to 100 (0, 10, 20… 100), with the possibility of assigning intermediate scores, such as 75 or 45. Higher scores correspond to a more effective system of legal protection.	Index of Economic Freedom (Miller et al., 2015)
	Public goods provision	Government effectiveness	Captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	The aggregate measure ranges from around -2.5 to 2.5, with higher values corresponding to better outcomes.	Worldwide Governance Indicators (World Bank, 2015a)
		Government expenditure on education	General government expenditure (current, capital, and transfers). It includes expenditure funded by transfers from international sources to government. Measured as a percentage of GDP.	Expressed as a percentage of GDP in that year.	World Bank (World Bank, 2016)
		Public health expenditure	Consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including	Expressed as a percentage of GDP in that year.	World Bank (World Bank, 2016)

Table B1.1. List of definitions, measures and data sources for the variables used in the analysis

Symptom	Dimension	Proxy	Definition	Measure	Data source
			donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds. Measured as a percentage of GDP.		
		Access to improved water	Percentage of the population using an improved drinking water source. The improved drinking water source includes piped water on premises (piped household water connection located inside the user's dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection).	Expressed as a percentage to the total population.	World Bank (World Bank, 2016)
	Raising revenues	Tax revenue	Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. Measured as a percentage of GDP.	Expressed as a percentage of GDP in that year.	World Bank (World Bank, 2016)
	Political authority	Failure of state authority	Refers to situations in which the institutions of the central state are weakened to the point that they can no longer maintain authority or political order in significant parts of the country. Examples of evidence include shut-downs of routine government services, failure of security forces and administrators to carry out any government directives, and anarchic conditions in large parts of the country, with attempts from rival militias, warlords, or local or regional authorities to establish autonomous zones of government,	The scale ranges from 1 (adverse regime change with no significant weakening of state institutions or persistent collapse of public order) to 4 (complete collapse or near-total collapse of public order). A score of 0 was assigned *a posteriori* to periods with no regime change.	Armed Conflict and Intervention, PITF (Marshall, Gurr and Harff, 2015)
Political violence	Repression	Physical integrity	The physical integrity rights index results from the addition of the scores for torture, extrajudicial killing, political imprisonment, and disappearance indicators.	Ranges from 0 (no government respect for these rights) to 8 (full government respect for these rights).	CIRI (Cingranelli, Richards and Clay, 2014)
		Empowerment rights	The empowerment rights index results from the addition of the scores for foreign movement, domestic movement, freedom of speech, freedom of assembly and association, workers' rights, electoral self-determination, and freedom of religion indicators.	Ranges from 0 (no government respect for these rights) to 14 (full government respect for these rights).	CIRI (Cingranelli, Richards and Clay, 2014)
		Political terror scale	Measures the level of political violence that a country experiences in a given year, based on the amount of violations of physical or personal integrity rights carried out by a state (or its agents).	Uses a 5-point coding scheme, with higher levels representing higher levels of "terror". Average value of the scores provided by Amnesty International, the U.S. State Department Country Reports on Human Rights Practices, and Human Rights Watch's World Reports.	Political Terror Scale (Gibney et al., 2013)
	Civil conflict	Major episodes of civil violence	Total summed magnitudes of all societal major episodes of political violence involving the state in a certain year, namely episodes of civil violence, of civil warfare, of ethnic violence and of ethnic warfare.	Total summed magnitudes of the four magnitude scores, each scaled from 1 (lowest) to 10 (highest) for each episode. A value of 0	Armed Conflict and Intervention, MEPV (Marshall, 2015)

Table B1.1. List of definitions, measures and data sources for the variables used in the analysis

Symptom	Dimension	Proxy	Definition	Measure	Data source
				was assigned *a posteriori* to periods with no episodes of civil violence.	
		Armed conflict	Number of armed conflicts defined as contested incompatibilities that concern government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths.	The number of internal and internationalised conflict events was considered, and a value of 0 was assigned *a posteriori* to periods with no armed conflict.	UCDP/PRIO (Gleditsch et al., 2002; Petterson and Wallensteen, 2015)
		Coups d'état	Total sum of successful coups and attempted (but ultimately unsuccessful coups d'état).	Sum of the number of successful coups and of attempted coups d'état that occurred in the year of record. A value of 0 was assigned *a posteriori* to periods with no coups.	Polity IV, Coups d'état (Marshall and Ramsey Marshall, 2015)
		Revolutionary wars	Measures the annual magnitude of episodes of violent conflict between governments and politically organised groups (political challengers) that seek to overthrow the central government, to replace its leaders, or to seize power in one region. It is based on the average scores of number of rebel combatants or activists, annual number of fatalities related to fighting, and portion of country affected by fighting.	Each of the magnitude scores ranges from 0 to 4. All decimal averages are assigned to decimal scores of "0.5". A score of -0.5 was assigned *a posteriori* to periods with no regime change. Higher vales correspond to higher magnitudes.	Armed Conflict and Intervention, PITF (Marshall, Gurr and Harff, 2015)
		Ethnic wars	Measures the annual magnitude of episodes of violent conflict between governments and national, ethnic, religious, or other communal minorities (ethnic challengers) in which the challengers seek major changes in their status. It is based on the average scores of number of rebel combatants or activists, annual number of fatalities related to fighting, and portion of country affected by fighting.	Each of the magnitude scores ranges from 0 to 4. All decimal averages are assigned to decimal scores of "0.5". A score of -0.5 was assigned *a posteriori* to periods with no regime change. Higher vales correspond to higher magnitudes.	Armed Conflict and Intervention, PITF (Marshall, Gurr and Harff, 2015)

Table B1.2. Correlation matrix

	Rule law	Reg qual	Enf cont	Ind jud	C corr	Prop rig	Gov eff	Educ	Health	A water	Tax rev	Fail state	Phys int	Emp rig	Pol terror	Ep viol	Ar conf	Coups	Rev war	Eth war
Rule law	1																			
Reg qual	**0.8893**	1																		
Enf cont	-0.2485	-0.2443	1																	
Ind jud	0.7304	0.6089	-0.1085	1																
C corr	**0.9332**	**0.868**	-0.2595	0.6612	1															
Prop rig	**0.8922**	**0.8662**	-0.1875	0.71	**0.8651**	1														
Gov eff	**0.9294**	**0.9328**	-0.2581	0.623	**0.9324**	**0.8743**	1													
Educ	0.2903	0.177	-0.0529	0.2561	0.3234	0.2703	0.27	1												
Health	0.5525	0.4128	-0.1142	0.499	0.516	0.5116	0.4548	0.5252	1											
A water	0.6352	0.5969	-0.1584	0.4124	0.5769	0.4832	0.6331	0.2457	0.4157	1										
Tax rev	0.3663	0.3488	-0.0703	0.3954	0.3642	0.3528	0.3677	0.4742	0.3648	0.3013	1									
Fail state	-0.2229	-0.2279	0.0252	-0.1026	-0.1785	-0.11	-0.2288	0.0012	-0.0928	-0.2728	-0.0883	1								
Phys int	0.6364	0.5606	-0.128	0.5894	0.6034	0.5437	0.5444	0.2912	0.5112	0.3713	0.3889	-0.1124	1							
Emp rig	0.5482	0.5733	0.0412	0.6675	0.5241	0.5581	0.5077	0.1759	0.4677	0.2896	0.3937	-0.0736	0.6006	1						
Pol terror	-0.6745	-0.6087	0.228	-0.5526	-0.6493	-0.5693	-0.6181	-0.2935	-0.5045	-0.4334	-0.3469	0.2565	**-0.8456**	-0.5462	1					
Ep civ viol	-0.264	-0.2543	0.2408	-0.1662	-0.2565	-0.1195	-0.2453	-0.1934	-0.2651	-0.2673	-0.2263	0.3486	-0.527	-0.2148	0.5764	1				
Arm conf	-0.1858	-0.2051	0.2093	-0.1187	-0.2027	-0.1178	-0.1717	-0.1663	-0.2381	-0.1912	-0.211	0.1332	-0.4778	-0.1828	0.4807	0.6948	1			
Coups	-0.1372	-0.1159	0.113	-0.0867	-0.114	-0.0945	-0.1289	-0.0528	-0.1083	-0.1216	-0.0279	0.1982	-0.0861	-0.0493	0.1072	0.0733	0.0277	1		
Rev war	-0.1756	-0.1305	0.2828	-0.1267	-0.148	-0.0861	-0.143	-0.0721	-0.1434	-0.1548	-0.1673	0.2395	-0.3005	-0.0995	0.3596	0.4479	0.3347	0.0627	1	
Eth war	-0.2343	-0.2351	0.1261	-0.1423	-0.2262	-0.0877	-0.2174	-0.1619	-0.2289	-0.2371	-0.1718	0.3439	-0.4599	-0.2342	0.5284	0.7834	0.6007	0.0455	0.1354	1

Notes: Values over 0.8 highlighted in bold.

Table B1.3. List of countries used in cluster analysis

Albania	Honduras	Slovenia
Algeria	Hungary	South Africa
Angola	India	Spain
Argentina	Indonesia	Sri Lanka
Armenia	Iran	Suriname
Australia	Ireland	Swaziland
Austria	Israel	Sweden
Azerbaijan	Italy	Switzerland
Bahrain	Jamaica	Syrian Arab Rep.
Bangladesh	Japan	Tajikistan
Belarus	Jordan	Tanzania
Belgium	Kazakhstan	Thailand
Benin	Kenya	Togo
Bolivia	Korea, Rep.	Trinidad & Tobago
Bosnia	Kuwait	Tunisia
Botswana	Kyrgyz Rep.	Turkey
Brazil	Lao	Turkmenistan
Bulgaria	Latvia	Uganda
Burkina Faso	Lebanon	Ukraine
Burundi	Lesotho	Un. Arab Emirates
Cambodia	Lithuania	United Kingdom
Cameroon	Luxembourg	United States
Canada	Macedonia	Uruguay
Cape Verde	Madagascar	Uzbekistan
Central African Rep.	Malawi	Venezuela
Chad	Malaysia	Vietnam
Chile	Mali	Yemen
China	Mauritania	Zambia
Colombia	Mauritius	
Congo, Dem. Rep.	Mexico	
Congo, Rep.	Moldova	
Costa Rica	Mongolia	
Côte d'Ivoire	Morocco	
Croatia	Mozambique	
Cuba	Myanmar	
Cyprus	Namibia	
Czech Rep.	Nepal	
Denmark	Netherlands	
Djibouti	New Zealand	
Dominican Rep.	Nicaragua	
Ecuador	Niger	
Egypt	Nigeria	
El Salvador	Norway	
Equatorial Guinea	Oman	
Estonia	Pakistan	
Ethiopia	Panama	
Fiji	Papua New Guinea	
Finland	Paraguay	
France	Peru	
Gabon	Philippines	
Gambia	Portugal	
Georgia	Qatar	
Germany	Romania	
Ghana	Russian Federation	
Greece	Rwanda	
Guatemala	Saudi Arabia	
Guinea	Senegal	
Guinea-Bissau	Sierra Leone	
Guyana	Singapore	
Haiti	Slovak Rep.	

Appendix B2. Alternatives tested with cluster analysis

This section includes the main conclusions from a battery of alternatives tested with cluster analysis. The referred baseline dataset included:

Table B2.1. Baseline dataset

Symptom	Elements	Proxies
State (in)effectiveness	Contract enforcement	Rule of law Regulatory quality Enforcing contracts Control of corruption
	Protection of property	Property rights enforcement
	Public goods provision	Government effectiveness Public spending on education Public health expenditure Access to improved water
	Raising revenue	Tax revenue
	Political institutions	Executive constraints Checks and balances Magnitude of regime change
Political violence	Repression	Physical integrity Civil liberties Political terror scale
	Civil conflict	Major episodes of civil violence Armed conflict Coups d'état Revolutionary wars Ethnic wars

There are three main differences to the dataset used in the chapter: i) impendence of judiciary is not included; ii) executive constrains and checks and balances were added as proxies for the quality of political institutions; iii) magnitude of regime change is used instead of failure of state authority; and, finally, iv) civil liberties is included instead of empowerment rights. The sources of the remaining variables are described in Table B1.2 in Appendix B1, but the sources for the remaining variables are:

Table B2.2. List of definitions, measures and data sources for the additional variables

Variable	Definition	Measure	Data source
Executive constraints	Captures the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities.	Seven-category scale, with higher values representing more constraints to executive authority.	Polity IV (Marshall and Ramsey Marshall, 2015)
Checks and balances	Captures the extent of which legislatures are competitively elected.	Unitary increments are made according to different assessment criteria. Higher values correspond to higher levels of checks and balances.	Database of Political Institutions (Keefer, 2013)
Magnitude of regime change	General score of the magnitude of a regime change, based on the scores of failure of state authority, collapse of democratic	Each of the magnitude scores ranges from 1 to 4. All decimal averages are assigned to decimal scores of "0.5". A score of 0 was assigned *a posteriori* to	Armed Conflict and Intervention, PITF (Marshall,

Table B2.2. List of definitions, measures and data sources for the additional variables

Variable	Definition	Measure	Data source
	institutions, and violence associated with adverse regime changes.	periods with no regime change. Higher vales correspond to higher magnitudes.	Gurr and Harff, 2015)
Civil liberties	Measures the score of a country in 15 civil liberties indicators, grouped into four subcategories: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights.	A country or territory is assigned a rating of 1 (highest) through 7 (lowest degree of freedom), based on the scores for each of the individual indicators.	Freedom House (2015)

The results presented in Table B2.3 were obtained by introducing different changes to the baseline dataset described above, and which ultimately lead to the dataset used in the cluster analysis included in the chapter. There were two main goals, which are represented by lines A and B:

- Line 'A) Preliminary analysis: inclusion of property rights' examines the differences verified in the results obtained with cluster analysis including the variable 'property rights' and excluding from the dataset.
- Line 'B) Exclusion of political institutions variables' examines the changes observed after dropping the variables 'executive constraints' and 'checks and balances'. Line 1) discusses the results obtained after excluding these two variables from the baseline dataset (which includes property rights). The comparison between the dataset with and without these two variables is then applied at the same time as considering different modifications of the baseline dataset, namely: 1.1) 'Empowerment rights' replaces 'civil liberties' because the data source is more reliable; 1.2) 'Failure of state authority' replaces 'magnitude of regime change' because it better captures the degree of state authority, whereas the magnitude of regime change also includes violence; 1.3) 'Independence of judiciary' is added to the analysis; 2) Baseline dataset with the substitutions in 1.1 and 1.2 made simultaneously; 3) Dataset used in 2 plus 'independence of judiciary'.

In all the hypotheses considered, the initial steps followed to obtain balanced datasets (as described in section 3.4 of the chapter) led to the exclusion of the variables enforcing contracts, public spending on education and tax revenue. The criteria considered for the comparison of the results comprises: a) the optimum number of countries identified; b) the list of countries included in the clusters representing 'more fragile states'; c) whether the observation of the mean values for each variable indicates that there is a differentiation between a cluster of countries that are 'more fragile' in terms of state effectiveness, and another for countries 'more fragile' in terms of political violence.

Table B2.3. Summary of conclusions from different alternatives considered in cluster analysis

<table>
<tr><th></th><th></th><th colspan="2">Periods</th><th colspan="2">Conclusions</th></tr>
<tr><th></th><th></th><th>1993-2002</th><th>2002-2003</th><th>Within group</th><th>Overall</th></tr>
<tr><td>A) Preliminary analysis: inclusion of property rights</td><td>Dataset with and without property rights (‘Baseline dataset’)</td><td colspan="4">- Keeping property rights means losing seven countries (Bhutan, Comoros, Eritrea, Iraq, Liberia, Solomon Islands, and Sudan).
- Differences in the position of countries.
- Differentiation between the symptoms is less clear.
- Same number of clusters.

CONCLUSION: Keep property rights because loss in the number of countries is not significant, and it is closer to the design of the analysis.</td></tr>
<tr><td rowspan="5">B) Exclusion of executive constraint an checks and balances</td><td>1) Baseline dataset with and without the two variables</td><td>4 clusters with PI and 3 without PI; roughly the same countries belonging to the clusters of more fragile states; no clear differentiation between the two dimensions.</td><td>3 clusters in both cases; similar group of more fragile states; differentiation between the two dimensions visible with PI, but not as visible without PI.</td><td rowspan="5">- Some alterations in terms of the optimum number of clusters.
- Some changes in the clusters of more fragile states.
- Variances in the differentiation between the dimensions.

CONCLUSION: The substitution of variables leads to some changes in the obtained results.</td><td rowspan="5">- Some alterations in terms of the optimum number of clusters.
- In only 2 out of the 12 alternatives excluding the PI variables lead to very different clusters of countries.
- The distinction between the two symptoms is not related to the inclusion or not of the PI variables.
- Overall, the groups of countries belonging to the clusters of ‘more fragile’ and ‘less fragile’ are roughly the same.

CONCLUSION: The optimum number of clusters is not fixed, and should be taken with caution. The clustering of countries does not suffer significant changes in most of the cases. The distinction of the two symptoms can only be seen in some cases, and is not linked with the inclusion or not of the PI variables. The groups of countries identified as ‘more fragile’ remains roughly the same across all the alternatives.</td></tr>
<tr><td>1.1) Baseline dataset with ‘empowerment rights’</td><td>4 clusters in both cases; roughly the same countries belonging to the cluster of more fragile states; no differentiation between the two dimensions in either case.</td><td>3 clusters in both cases; roughly the same cluster with more fragile states; differentiation between the two dimensions visible with PI, but not as visible without PI.</td></tr>
<tr><td>1.2) Baseline dataset with ‘failure of state authority’</td><td>4 clusters with PI, but 3 without PI; roughly the same countries belonging to the cluster of more fragile states; no differentiation between the two dimensions.</td><td>3 clusters in both cases; roughly the same cluster with more fragile states; differentiation visible in both cases.</td></tr>
<tr><td>1.3) Baseline dataset plus ‘independence of judiciary’</td><td>3 clusters with PI, but 4 without PI; some differences in the clusters of countries; no clear differentiation between the two dimensions.</td><td>3 clusters in both cases; roughly the same cluster with more fragile states; differentiation visible in both cases.</td></tr>
<tr><td>2) Baseline dataset with substitutions 1.1 and 1.2</td><td>4 clusters with PI, but 3 without PI; similar clusters of more fragile states, although with some differences (more countries without PI); differentiation between the two symptoms is not visible in either case.</td><td>4 clusters with PI, but 3 without PI; different clusters of countries; differentiation between the two symptoms is clear with PI, but not without PI.</td></tr>
</table>

Table B2.3. Summary of conclusions from different alternatives considered in cluster analysis

	Periods		Conclusions	
	1993-2002	2002-2003	Within group	Overall
3) Dataset in 2) plus 'independence of judiciary'	3 clusters with PI and 4 clusters without PI; similar lists of more fragile includes more countries with PI; differentiation between the two symptoms is not visible in either case.	3 clusters in both cases; similar list in the cluster of more fragile countries; differentiation between the two symptoms is visible in both cases.		

Appendix B3. Scores obtained with PCA: additional tables

Table B3.1. Annual scores for the state effectiveness index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Afghanistan													
Albania	-1.40	-1.55	-1.53	-1.02	-1.09	-0.72	-0.86	-1.15	-0.98	-0.65	-0.55	-0.50	-0.69
Algeria	-1.38	-1.49	-1.37	-1.38	-1.59	-1.26	-1.98	-2.24	-1.98	-1.61	-1.47	-1.66	-1.75
American Samoa													
Andorra													
Angola	-3.95	-3.54	-3.57					-3.38	-3.80	-3.68	-3.72	-3.57	-3.64
Anguilla													
Antigua & Bermuda													
Argentina	1.17	1.03	0.83	-0.37	-0.41	-0.55	-0.15	-0.19	-0.11	-0.77	-0.94	-0.91	-0.48
Armenia	-0.93	-0.89	-0.94	-0.56	-0.44	-0.56	-0.70	-0.72	-1.38	-1.43	-1.28	-1.45	-1.24
Aruba													
Australia	4.49	4.56	4.77	4.58	4.67	4.97	4.73	4.85	4.92	4.86	4.91	4.86	5.07
Austria	5.05	4.83	4.80	4.93	4.88	4.94	4.93	4.97	5.07	5.03	4.82	5.00	4.83
Azerbaijan	-3.11	-2.82	-2.99	-2.72	-2.74	-2.69	-2.57	-2.57	-2.75	-2.47	-2.63	-2.88	-2.81
Bahamas													
Bahrain	0.36	0.55	0.60	1.06	1.15	1.11	0.84	0.73	0.71	1.17	1.28	0.84	0.26
Bangladesh	-2.67	-1.99	-2.33	-2.62	-3.21	-3.28	-3.15	-3.02	-3.54	-2.95	-2.95	-2.92	-2.78
Barbados													
Belarus	-1.57	-2.16	-2.17	-2.43	-2.26	-2.52	-2.38	-2.66	-2.48	-2.45	-2.51	-2.58	-2.55
Belgium	4.44	4.23	4.39	4.51	4.63	4.57	4.45	4.35	4.25	4.20	4.38	4.37	4.54
Belize													
Benin	-0.47	-0.40	-0.40	-1.11	-1.13	-1.04	-1.54	-1.66	-1.60	-1.81	-1.72	-1.45	-1.24
Bermuda													
Bhutan											0.51	0.68	0.77
Bolivia	-0.16	0.28	-0.35	-0.58	-1.00	-0.97	-1.16	-1.55	-1.16	-1.88	-1.54	-1.66	-1.70
Bosnia				-1.07	-0.82	-0.69	-0.75	-0.64	-0.77	-0.83	-0.40	-0.40	-0.18
Botswana	2.23	2.12	2.24	2.29	2.39	2.31	2.48	2.14	2.18	2.07	2.26	2.37	2.34
Brazil	-0.08	0.01	-0.01	0.07	0.07	-0.05	-0.24	-0.34	-0.22	-0.63	-0.47	-0.16	0.16
Brunei													
Bulgaria	-0.48	-0.06	0.04	0.89	0.77	0.56	0.52	0.30	0.35	0.36	0.41	0.01	-0.13
Burkina Faso	-1.79	-1.72	-1.39	-1.80	-1.47	-1.35	-1.24	-1.55	-1.20	-1.07	-1.11	-0.86	-1.25
Burundi		-3.44	-3.17					-2.94	-2.91	-3.06	-2.71	-2.78	-2.70
Cambodia		-3.34	-3.02	-2.68	-2.94	-2.90	-3.07	-3.07	-3.08	-2.95	-2.92	-2.82	-2.66
Cameroon	-3.13	-2.91	-3.01	-2.87	-2.76	-2.75	-3.23	-3.05	-2.84	-3.31	-2.84	-2.95	-2.79
Canada	4.99	5.06	4.99	4.94	5.05	5.01	4.82	4.97	4.85	4.85	5.30	5.16	5.07
Cape Verde					1.09	1.18	0.92	1.84	1.78	1.67	1.71	1.59	1.72
Cayman Islands													
Central African Rep.				-2.38	-3.51	-3.28	-3.51	-3.32	-3.68	-3.39	-3.39	-3.33	-3.06
Chad		-3.33	-3.02	-2.90	-3.28	-3.73	-3.59	-4.05	-3.82	-4.61	-3.93	-3.64	-3.84
Chile	3.02	2.65	3.41	3.74	3.19	3.60	3.64	3.58	3.70	3.42	3.50	3.78	3.52
China	-1.82	-1.99	-2.28	-2.49	-2.33	-2.31	-2.39	-2.12	-2.25	-2.10	-2.12	-2.13	-2.17
Colombia	-0.43	-0.14	-0.26	-0.50	-0.50	-0.59	-0.44	-0.82	-0.54	-0.44	-0.42	-0.30	0.37
Comoros											-2.22	-1.77	
Congo, Dem. Rep.											-4.25	-4.53	-4.82
Congo, Rep.		-3.35	-2.96	-2.60	-2.62	-2.26	-2.65	-3.22	-3.34	-3.32	-3.16	-2.99	-2.60
Cook Islands													
Costa Rica	2.10	2.45	2.29	2.29	2.33	1.90	2.05	1.90	1.90	1.86	2.15	2.36	1.78
Côte d'Ivoire	-1.03	-1.41	-2.65	-2.40	-2.79	-2.97	-3.56	-3.93	-3.66	-3.41	-3.28	-3.62	-3.40
Croatia	0.07	-0.39	0.69	0.78	0.81	0.98	0.98	1.07	1.44	1.24	1.28	1.61	1.86
Cuba	-2.35	-2.09	-1.88	-1.91	-1.99	-2.11	-1.91	-1.85	-1.14	-1.51	-1.38	-1.53	-1.52
Cyprus	2.79	2.70	2.95	3.26	3.11	3.08	3.15	3.31	3.42	3.58	3.60	3.52	3.31
Czech Rep.	3.10	2.80	2.47	3.03	3.10	2.76	2.48	2.52	2.11	2.26	2.83	2.75	3.16
Denmark	5.38	5.42	5.45	5.53	5.71	5.83	5.59	5.86	5.68	5.68	5.82	5.82	5.79
Djibouti					-1.99	-1.51	-1.67	-1.64	-1.41	-0.62	-0.63	-0.74	-1.63
Dominica													
Dominican Rep.	-1.25	-1.29	-0.98	-0.93	-1.25	-1.36	-1.05	-1.36	-1.27	-1.99	-2.01	-1.89	-1.98
Ecuador	-0.85	-0.85	-1.83	-1.84	-1.78	-1.52	-1.88	-2.42	-1.93	-1.95	-2.02	-2.21	-2.30
Egypt	-0.35	-0.28	-0.70	-1.04	-1.03	-1.10	-0.95	-1.56	-1.61	-1.66	-1.52	-1.64	-1.39
El Salvador	-0.78	-0.15	0.00	-0.10	-0.33	-0.13	-0.21	-0.47	-0.71	-0.46	-0.25	-0.18	-0.41
Equatorial Guinea					-3.93	-4.25	-4.27	-4.18					
Eritrea													
Estonia	2.65	2.92	3.03	2.84	3.12	3.12	3.14	3.20	3.39	3.71	3.80	3.63	3.62
Ethiopia	-3.39	-3.00	-2.41	-3.04	-2.89	-2.79	-3.04	-2.53	-2.21	-2.52	-2.53	-2.60	-2.23
Fiji	1.11	0.87	-0.88	0.43	0.28	0.18	0.28	-0.55	-1.44	-1.44	-1.88	-1.78	-1.36
Finland	5.15	5.33	5.40	5.44	5.47	5.53	5.35	5.39	5.16	5.22	5.47	5.36	5.38
France	4.00	3.95	4.03	3.94	4.01	4.12	4.14	4.14	4.11	4.05	4.24	4.33	4.24
French Guiana													
Gabon	-0.84	-0.62	-0.62	-0.57	-0.57	-1.09	-1.25	-1.79	-1.82	-2.08	-1.91	-1.48	-0.99
Gambia		-0.23	-0.91	-0.74	-0.29	-0.55	-1.04	-1.29	-1.17	-1.54	-1.62	-1.73	-1.61
Georgia	-2.71	-2.59	-1.61	-2.03	-1.68	-1.38	-1.65	-0.83	-1.05	-0.47	-0.70	-0.43	-0.01
Germany	5.04	5.05	5.04	4.85	4.62	4.59	4.78	4.92	4.90	4.75	4.94	4.85	4.85
Ghana	-0.29	-0.39	-0.22	-0.59	-0.28	-0.21	-0.06	0.01	0.26	-0.05	0.04	0.00	-0.01
Greece	2.40	2.67	2.69	2.16	2.10	2.25	1.73	1.58	1.49	1.40	1.51	1.70	1.20
Greenland													
Grenada													
Guam													

Table B3.1. Annual scores for the state effectiveness index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Guatemala	-1.16	-0.85	-0.97	-1.20	-1.24	-1.09	-1.34	-1.75	-1.55	-1.44	-1.39	-0.87	-1.31
Guinea	-3.37	-2.92	-2.99	-2.79	-2.65	-2.81	-2.91	-3.67	-3.74	-3.76	-3.95	-3.24	-3.63
Guinea-Bissau			-3.25	-2.75	-3.34	-2.70	-2.83	-3.04	-2.77	-3.52	-3.54	-3.12	-2.95
Guyana	0.36	0.40	0.09	-0.08	-0.24	-0.28	-0.41	-0.51	-0.11	0.11	0.01	0.11	-0.37
Haiti	-3.26	-3.38	-3.92	-4.15	-4.28	-4.15	-4.09	-3.40	-3.34	-3.18	-3.20	-3.78	-4.03
Honduras	-1.13	-0.73	-0.72	-0.88	-0.92	-1.17	-1.23	-1.63	-1.54	-1.70	-2.03	-1.66	-1.51
Hong Kong													
Hungary	3.04	3.01	2.99	2.98	3.06	2.95	3.01	3.10	2.85	2.81	2.70	2.55	2.52
Iceland													
India	0.65	0.50	0.66	0.25	0.48	0.50	0.38	0.53	0.37	0.28	0.31	-0.29	-0.57
Indonesia	-2.05	-2.01	-1.83	-2.49	-2.64	-2.41	-2.26	-1.70	-1.94	-2.02	-2.19	-2.01	-2.08
Iran	-3.05	-3.15	-2.97	-2.91	-2.67		-2.88		-3.24	-3.36	-3.38	-3.41	-3.27
Iraq	-4.54	-4.73	-5.29	-5.13									
Ireland	4.50	4.61	4.60	4.62	4.43	4.36	4.60	4.75	4.65	4.71	4.77	4.63	4.46
Israel	3.40	2.63	2.49	2.76	2.78	2.65	2.42	2.75	2.45	2.22	2.17	2.31	2.49
Italy	2.87	2.93	3.04	2.90	2.94	2.87	2.66	2.03	1.67	1.81	1.54	1.86	1.69
Jamaica	1.25	1.05	0.92	0.27	0.15	0.34	0.21	0.02	0.44	0.29	-0.04	-0.31	-0.07
Japan	3.58	3.72	4.00	3.19	3.60	3.85	3.95	4.18	3.98	4.01	4.10	4.18	4.24
Jersey, Channel Isl.													
Jordan	1.09	0.81	0.58	0.21	0.60	0.50	0.43	0.44	0.48	0.43	0.09	-0.20	0.25
Kazakhstan		-1.84	-2.35	-2.39	-2.17	-2.25	-1.63	-1.98	-2.26	-1.97	-1.89	-1.98	-1.99
Kenya	-2.15	-2.17	-2.24	-2.38	-2.21	-1.77	-2.42	-2.20	-2.63	-2.69	-2.69	-2.62	-2.54
Kiribati													
Korea, Dem. Rep.													
Korea, Rep.	1.32	1.51	1.68	1.76	2.11	2.15	2.37	2.30	2.55	2.18	2.49	2.73	2.67
Kosovo													
Kuwait	0.87	1.14	1.00	1.20	1.01	0.72	0.93	0.65	0.50	0.47	0.73	0.51	0.28
Kyrgyz Rep.		-1.26	-1.92	-1.83	-2.46	-2.03	-1.95	-2.45	-1.85	-1.60	-1.95	-1.89	-1.92
Lao	-2.76	-3.11	-3.81	-3.82	-4.25	-3.94	-3.72	-3.86	-3.34	-2.84	-2.93	-2.67	-2.65
Latvia	0.83	1.12	1.22	1.43	1.71	1.69	1.56	1.81	1.66	1.43	1.74	2.00	1.47
Lebanon				-0.66	-0.87	-0.82	-0.70	-1.34	-1.58	-1.15	-1.42	-1.31	-1.55
Lesotho	0.14		0.49	0.61	0.41	0.40	0.36	0.30	0.07	0.37	0.18	0.64	0.92
Liberia											-2.45	-2.41	-1.53
Libya	-3.96	-4.14	-3.84										
Liechtenstein													
Lithuania	1.81	1.95	1.67	2.06	2.23	2.25	2.10	2.05	2.14	2.05	2.17	2.31	2.25
Luxembourg	5.06	4.98	5.30	5.43	5.15	5.29	4.98	5.00	4.98	5.07	5.11	5.05	5.13
Macao													
Macedonia				-0.17	0.10	0.47	-0.16	-0.45	-0.03	0.27	0.38	-0.02	-0.17
Madagascar	-1.17	-1.37	-0.91	-1.35	-0.94	-0.98	-1.50	-1.42	-1.16	-1.56	-2.65	-2.95	-2.59
Malawi	-1.04	-0.62	-0.55	-1.19	-0.95	-0.60	-0.24	-0.26	-0.38	-0.20	0.38	0.19	0.01
Malaysia	1.25	0.81	0.79	0.71	0.82	0.74	0.31	0.72	0.30	0.01	0.23	0.48	0.46
Maldives													
Mali	-1.01	-1.33	-1.00	-0.81	-0.80	-0.69	-1.43	-1.49	-0.92	-1.55	-1.46	-1.56	-1.39
Malta													
Marshall Islands													
Martinique													
Mauritania	-1.36	-1.49	-1.38	-0.86	-1.55	-1.46	-2.64	-2.45	-1.97	-3.50	-2.63	-2.46	-2.69
Mauritius			2.16	2.31	2.50	2.20	2.19	2.06	2.02	2.13	2.20	2.28	2.26
Mexico	-0.57	-0.24	-0.28	-0.14	-0.17	-0.15	-0.30	-0.24	0.07	-0.49	-0.38	-0.40	-0.30
Micronesia													
Moldova	1.05	0.73	-0.36	-0.52	-0.81	-0.78	-0.63	-0.90	-0.46	-0.86	-1.10	-0.99	-0.82
Monaco													
Mongolia	0.72	0.26	0.03	0.24	-0.20	-0.44	-0.60	-0.96	-0.97	-1.11	-0.83	-0.74	-0.68
Montenegro											0.38	0.56	0.14
Morocco	-0.35	-0.23	-0.72	-0.92	-1.38	-1.33	-1.81	-1.53	-1.67	-1.60	-1.38	-1.24	-1.45
Mozambique	-2.20	-2.17	-2.15	-1.81	-2.00	-2.39	-1.75	-2.17	-2.28	-2.28	-2.14	-2.18	-2.24
Myanmar	-3.73	-3.88	-3.81	-4.00	-4.47	-4.70	-4.22	-4.45	-4.47	-4.40	-4.38	-4.58	-4.27
Namibia		1.40	1.34	0.98	1.33	1.12	0.59	0.55	0.58	0.95	0.97	0.83	0.79
Nauru													
Nepal	-0.83	-0.95	-1.24	-2.03	-1.46	-1.88	-2.15	-1.88	-1.89	-2.14	-2.05	-2.38	-1.83
Netherlands	5.15	5.23	5.29	5.13	5.18	5.23	5.23	5.39	5.41	5.31	5.37	5.46	5.57
N. Antilles													
New Caledonia													
New Zealand	5.26	5.28	5.13	5.10	5.18	5.34	5.15	5.21	5.22	5.43	5.68	5.63	5.71
Nicaragua	-1.12	-1.15	-1.04	-1.05	-0.91	-0.76	-0.95	-1.40	-1.31	-1.78	-1.71	-1.88	-1.93
Niger	-3.39	-2.54	-2.17	-2.03	-2.07	-2.01	-2.17	-2.17	-2.01	-2.15	-2.10	-2.26	-1.74
Nigeria	-3.47	-3.18	-3.33	-3.32	-3.19	-2.84	-3.46	-3.12	-2.95	-2.84	-2.83	-3.28	-3.18
Niue													
Norway	5.40	5.52	5.16	5.32	5.40	5.47	5.24	5.29	5.27	5.07	5.30	5.32	5.36
Oman	0.50	0.30	0.46	0.94	0.77	1.03	0.02	0.65	0.87	0.97	1.19	1.16	0.22
Pakistan	-1.35		-2.71	-2.66	-2.70	-2.21	-2.25	-1.94	-1.95	-2.12	-2.15	-2.26	-2.29
Palau													
Panama	0.52	1.04	0.85	0.80	0.39	0.51	0.07	0.26	0.52	0.60	0.40	0.06	0.87
Papua New Guinea	-0.86	-0.95	-0.91								-2.12	-2.02	-1.78
Paraguay	-1.17	-1.91	-2.38	-1.98	-1.91	-1.81	-1.80	-2.33	-2.15	-1.97	-1.45	-1.43	-1.28
Peru	-0.22	-0.08	-0.48	-0.85	-0.91	-0.45	-0.52	-0.48	-0.15	-0.11	-0.33	-0.26	-0.36
Philippines	0.74	0.91	0.17	-0.03	-0.20	-0.93	-0.70	-1.16	-1.13	-1.24	-1.19	-1.23	-0.80
Poland													
Portugal	3.77	3.65	3.53	3.71	3.67	3.64	3.64	3.33	3.35	3.39	3.48	3.27	3.21
Puerto Rico													

Table B3.1. Annual scores for the state effectiveness index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Qatar					1.21	1.17	1.04	1.16	0.71	1.36	1.82	1.87	1.48
Réunion													
Romania	-0.39	-0.57	-0.63	-0.36	-0.17	-0.33	-0.27	-0.19	-0.17	-0.23			
Russian Federation	-0.57	-1.45	-0.99	-0.88	-1.12	-1.18	-1.21	-1.42	-1.63	-1.98	-1.96	-2.08	-2.15
Rwanda		-3.08	-3.03	-2.39	-2.30	-2.24	-2.11	-1.55	-1.05	-0.86	-0.80	-0.49	-0.41
Samoa													
San Marino													
S. Tome & Principe													
Saudi Arabia	-0.37	-0.38	-0.64	-0.43	-0.43	-0.67	-0.88	-0.59	-1.02	-1.05	-1.28	-1.02	-1.52
Senegal	-0.18	-0.79	-0.39	-0.21	-0.37	-0.12	-0.35	-1.09	-1.02	-0.77	-1.44	-1.58	-1.31
Serbia											0.01	0.05	0.45
Seychelles													
Sierra Leone	-3.43				-2.95	-2.63	-2.83	-2.86	-2.82	-2.80		-2.51	-2.32
Singapore	3.54	3.72	3.62	3.43	3.52	3.52	3.80	3.43	3.37	3.43	3.40	3.37	3.78
Slovak Rep.	1.68	1.67	1.42	1.52	1.86	2.16	2.40	2.01	1.87	1.95	1.61	1.64	1.56
Slovenia		3.61	2.98	2.97	2.91	3.04	2.88	2.93	2.93	3.07	3.56	3.26	3.27
Solomon Islands											-0.44	-0.06	0.14
Somalia													
South Africa	1.49	0.95	1.20	1.21	1.21	1.29	1.20	1.16	0.29	0.40	0.42	0.43	0.99
South Sudan													
Spain	3.46	3.72	3.73	3.48	3.45	3.42	3.33	2.93	2.88	3.05	3.15	3.33	3.29
Sri Lanka	-0.03	0.02	0.09	0.59	0.51	0.23	-0.03	0.09	-0.17	-0.66	-0.86	-1.92	-1.81
St. Kitts & Nevis													
St. Lucia													
St. Vincent & Gren.													
Sudan	-3.62	-3.48	-3.55										
Suriname					0.19	0.12	0.54	-0.05	-0.08	0.52	0.06	0.30	0.30
Swaziland	-0.55	-1.01	-1.22	-1.19	-1.42	-1.62	-1.61	-1.10	-1.31	-1.17	-1.13	-1.00	-1.52
Sweden	4.94	4.89	4.90	5.31	5.35	5.44	5.08	5.12	5.21	5.24	5.41	5.43	5.39
Switzerland	4.68	5.17	5.16	5.03	4.91	5.03	4.88	4.89	4.82	4.86	4.94	5.07	4.98
Syrian Arab Rep.	-2.15	-2.37	-2.42	-1.87	-2.15	-2.18	-2.31	-3.04	-3.02	-3.08	-2.86	-2.94	-2.38
Taiwan													
Tajikistan		-3.46	-3.47	-3.45	-3.17	-3.10	-3.11	-3.03	-3.18	-3.20	-3.11	-2.96	-2.90
Tanzania	-1.77	-1.79	-1.84	-1.96	-2.09	-1.99	-2.01	-1.78	-1.74	-2.05	-1.87	-2.04	-2.19
Thailand	0.80	0.80	0.70	0.62	0.59	0.30	-0.01	-0.77	-0.09	-0.08	-0.39	-0.36	-0.10
Timor-Leste											-1.72	-1.76	-2.20
Togo			-2.79	-2.96	-3.12	-3.28	-4.03	-3.33	-3.25	-2.87	-2.78	-2.99	-2.80
Tonga													
Trinidad & Tobago	2.25	2.31	2.23	1.77	1.72	1.46	1.28	0.73	1.21	0.87	1.01	0.84	0.82
Tunisia	-0.39	-0.61	-0.67	-0.14	-0.45	-0.37	-0.52	-0.40	-0.52	-0.71	-0.57	-0.72	-0.48
Turkey	0.26	0.20	0.10	-0.43	-0.08	0.23	0.31	0.41	0.10	-0.02	0.31	0.81	0.76
Turkmenistan		-2.98	-3.18	-3.51	-3.80	-3.99	-4.38	-4.51	-4.45	-4.38	-4.38	-4.47	-4.52
Tuvalu													
Uganda	-1.03	-0.85	-1.52	-1.41	-1.33	-1.31	-1.83	-1.55	-1.96	-2.09	-2.45	-2.28	-1.65
Ukraine	-1.00	-1.68	-1.61	-1.38	-1.44	-1.28	-1.39	-1.39	-1.60	-1.66	-1.62	-1.51	-1.65
Un. Arab Emirates	1.77	1.28	1.38	1.45	1.25	1.25	0.85	0.89	0.71	0.41	0.52	0.44	0.70
United Kingdom	4.91	4.92	4.78	4.75	4.84	4.88	4.44	4.88	4.69	4.68	4.65	4.82	4.79
United States	4.53	4.58	4.67	4.63	4.55	4.30	4.15	4.14	4.21	4.36	4.22	4.28	4.21
Uruguay	2.54	2.44	2.56	2.69	2.46	2.15	2.40	2.65	2.77	2.80	2.89	2.94	2.58
Uzbekistan		-2.85	-2.75	-3.02	-3.01	-2.98	-3.82	-3.29	-3.13	-2.58	-3.30	-3.32	-3.44
Vanuatu													
Venezuela	-1.43	-1.20	-1.03	-2.45		-2.64	-2.63	-2.81	-3.07				
Vietnam	-2.40	-2.45	-2.57	-2.60	-2.55	-2.69	-2.34	-2.33	-2.24	-2.48	-2.14	-2.12	-2.08
Virgin Islands													
West Bank & Gaza													
Yemen	-2.63	-2.89	-3.28	-3.24	-3.22	-3.34	-3.16	-2.94	-2.92	-3.20	-3.50	-3.74	-3.79
Zambia	-1.49	-1.21	-1.14	-0.94	-0.95	-1.41	-1.68	-1.40	-1.50	-1.44	-1.72	-2.22	-1.48
Zimbabwe													

Table B3.2. Annual scores for the political violence index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Afghanistan													
Albania	-0.31	-0.91	-0.25	-0.60	-0.71	-0.75	-0.87	-0.74	-0.86	-1.06	-1.04	-1.02	-0.84
Algeria	4.57	4.73	3.99	4.13	4.22	2.99	0.84	1.37	0.76	0.50	0.18	0.49	0.62
American Samoa													
Andorra													
Angola	5.81	9.50	7.89					-0.30	0.97	-0.10	1.02	-0.24	-0.22
Anguilla													
Antigua & Bermuda													
Argentina	-0.65	-0.35	-0.52	-0.56	-0.85	-0.55	-1.00	-0.86	-1.01	-0.83	-0.77	-0.73	-0.73
Armenia	-0.54	-0.29	-0.39	-0.43	-0.67	-0.29	-0.60	-0.59	-0.15	0.10	-0.06	-0.06	-0.13
Aruba													
Australia	-1.34	-1.35	-1.36	-1.21	-1.06	-1.21	-1.22	-1.37	-1.37	-1.33	-1.25	-1.23	-1.42
Austria	-1.54	-1.22	-1.07	-1.09	-0.94	-1.10	-1.25	-1.12	-1.12	-1.28	-1.15	-1.33	-1.45
Azerbaijan	2.16	0.37	-0.26	-0.28	-0.08	-0.11	0.96	-0.10	0.19	0.72	-0.07	0.05	0.03
Bahamas													
Bahrain	0.06	-0.07	-0.05	-0.84	-1.12	-0.99	-0.75	-0.77	-0.69	-0.73	-0.99	-0.36	0.56
Bangladesh	-0.26	-0.06	0.11	0.41	0.58	0.56	1.47	1.35	0.45	0.56	0.55	0.40	0.25
Barbados													
Belarus	-0.42	-0.32	-0.20	-0.42	-0.44	-0.02	-0.44	-0.13	-0.34	-0.20	-0.15	-0.02	-0.28
Belgium	-1.53	-1.37	-1.50	-1.38	-1.43	-1.29	-1.41	-1.39	-1.40	-1.31	-1.33	-1.32	-1.59
Belize													
Benin	-1.49	-1.09	-1.08	-1.03	-0.90	-1.05	-0.73	-0.63	-0.73	-0.64	-0.70	-0.55	-0.73
Bermuda													
Bhutan											-0.23	-0.54	-0.57
Bolivia	-1.08	-0.62	-0.49	-0.97	-0.33	-0.77	-0.79	-0.77	-0.77	-0.58	-1.13	-0.86	-0.83
Bosnia				-0.93	-0.97	-1.02	-1.06	-1.09	-0.94	-1.10	-0.99	-0.99	-1.11
Botswana	-1.30	-1.10	-1.28	-1.02	-0.94	-0.99	-1.02	-0.85	-0.96	-0.78	-0.85	-1.27	-1.26
Brazil	-0.03	-0.04	0.12	-0.04	0.00	-0.02	-0.01	0.24	-0.03	0.05	0.11	-0.05	0.10
Brunei													
Bulgaria	-0.36	-0.50	-0.35	-0.92	-0.76	-0.78	-0.77	-0.75	-0.78	-0.91	-0.88	-0.77	-0.73
Burkina Faso	-0.99	-0.61	-0.60	-0.33	-0.79	-0.81	-0.84	-0.49	-0.72	-0.68	-0.78	-0.87	-0.50
Burundi		6.12	5.18					1.23	0.09	1.27	-0.18	0.07	0.03
Cambodia		1.19	-0.77	-0.48	-0.27	-0.28	-0.22	-0.13	0.20	-0.09	-0.07	-0.21	-0.26
Cameroon	-0.17	0.41	0.58	0.12	0.19	0.05	0.02	-0.03	-0.20	0.38	-0.26	-0.09	-0.18
Canada	-1.54	-1.39	-1.39	-1.25	-1.41	-1.41	-1.24	-1.27	-1.13	-1.11	-1.61	-1.32	-1.42
Cape Verde					-1.40	-1.42	-1.09	-1.37	-1.06	-1.05	-1.06	-1.07	-1.06
Cayman Islands													
Central African Rep.				0.97	0.27	-0.09	1.42	4.03	2.54	2.40	3.36	3.50	3.90
Chad		1.23	0.82	0.48	0.65	0.21	2.27	3.41	3.42	3.99	4.12	3.12	-0.01
Chile	-0.68	-0.23	-0.56	-1.14	-0.70	-1.10	-1.21	-1.09	-1.12	-0.66	-0.68	-1.15	-0.68
China	2.43	2.88	0.56	0.71	0.71	0.71	0.86	0.67	0.57	1.50	1.85	1.85	1.51
Colombia	4.57	4.75	5.28	5.02	5.30	5.36	5.20	5.24	5.04	5.20	4.48	4.56	4.39
Comoros											-1.40	-1.39	
Congo, Dem. Rep.											4.86	4.24	3.57
Congo, Rep.		4.40	0.15	1.48	0.31	-0.66	-0.42	-0.45	-0.40	-0.29	-0.82	-0.76	-0.63
Cook Islands													
Costa Rica	-1.30	-1.47	-1.35	-1.48	-1.46	-1.14	-1.44	-1.43	-1.29	-1.11	-1.17	-1.50	-1.03
Côte d'Ivoire	-0.15	-0.24	0.93	3.99	4.16	4.25	3.35	0.52	0.32	0.18	0.18	0.33	4.08
Croatia	-0.75	-0.42	-1.25	-1.11	-1.07	-1.10	-1.10	-1.27	-1.64	-1.32	-1.32	-1.09	-1.56
Cuba	-0.07	-0.08	-0.23	-0.40	-0.38	-0.38	-0.41	-0.24	-0.20	-0.36	-0.40	-0.35	-0.35
Cyprus	-1.09	-1.11	-1.21	-0.89	-0.88	-0.89	-0.81	-0.90	-0.92	-1.03	-1.10	-1.11	-1.08
Czech Rep.	-1.55	-1.22	-1.22	-1.35	-1.26	-0.93	-1.05	-1.18	-1.23	-1.35	-1.40	-1.53	-1.53
Denmark	-1.58	-1.58	-1.46	-1.47	-1.63	-1.63	-1.61	-1.64	-1.29	-1.45	-1.34	-1.66	-1.62
Djibouti					-0.29	-0.72	-0.74	-0.62	-0.65	-1.08	-1.09	-1.08	-0.29
Dominica													
Dominican Rep.	-0.31	-0.02	-0.45	-0.60	-0.29	-0.38	-0.24	-0.12	-0.32	0.07	0.05	-0.14	-0.08
Ecuador	-0.62	-0.62	-0.77	-0.39	-0.15	-0.47	-0.25	-0.29	-0.32	-0.42	-0.46	-1.05	-0.43
Egypt	2.45	2.01	-0.07	0.39	0.35	0.41	0.21	0.35	0.22	0.39	0.39	0.41	3.27
El Salvador	-0.66	-1.00	-0.65	-1.12	-0.49	-0.62	-0.63	-0.51	-0.30	-0.62	-0.66	-0.69	-0.54
Equatorial Guinea					-0.27	0.00	0.13	-0.02					
Eritrea													
Estonia	-1.25	-1.42	-1.53	-1.07	-1.37	-1.19	-1.19	-1.28	-0.98	-1.19	-1.37	-1.37	-1.36
Ethiopia	1.65	1.59	3.39	1.88	2.00	2.02	2.19	1.89	3.82	3.57	3.78	3.61	3.61
Fiji	-1.32	-1.35	-1.01	-1.05	-1.09	-1.08	-1.22	-0.97	-0.36	-0.78	-0.74	-0.73	-0.55
Finland	-1.54	-1.52	-1.51	-1.53	-1.39	-1.55	-1.41	-1.41	-1.38	-1.38	-1.37	-1.37	-1.50
France	-1.35	-1.20	-1.19	-1.20	-0.91	-1.03	-1.18	-1.18	-1.18	-1.14	-1.36	-1.29	-1.29
French Guiana													
Gabon	-0.88	-0.92	-1.00	-0.85	-0.88	-0.71	-0.23	-0.28	-0.59	-0.38	-0.40	-0.78	-0.81
Gambia		-0.90	-0.41	-0.91	-0.84	-0.83	-0.83	-0.15	-0.39	-0.67	-0.24	-0.25	-0.11
Georgia	-0.11	0.82	-0.51	-0.34	-0.18	0.63	-0.43	-0.19	-0.14	0.57	-0.94	-0.18	-0.22
Germany	-1.57	-1.56	-1.56	-1.25	-1.11	-1.09	-1.39	-1.54	-1.53	-1.39	-1.57	-1.42	-1.44
Ghana	-1.10	-1.02	-0.70	-0.53	-0.74	-0.76	-0.89	-0.58	-0.65	-0.56	-0.57	-0.30	-0.29
Greece	-0.87	-1.16	-1.18	-1.00	-0.74	-0.90	-0.87	-0.59	-0.58	-0.44	-0.65	-0.96	-0.76
Greenland													
Grenada													
Guam													
Guatemala	3.10	-0.33	-0.03	-0.30	-0.45	-0.60	-0.44	-0.18	-0.47	-0.72	-0.60	-0.61	-0.59
Guinea	-0.17	-0.16	2.26	-0.32	-0.74	-0.60	-0.52	-0.51	0.41	-0.35	0.75	-0.25	-0.51
Guinea-Bissau			-1.35	-0.77	-0.92	-1.00	-0.80	-0.77	-1.06	-1.54	-0.58	-1.06	-1.24
Guyana	-0.99	-1.28	-0.87	-0.72	-0.41	-0.40	-0.67	-0.58	-0.73	-0.81	-0.53	-0.92	-0.93
Haiti	-0.56	-0.30	-0.72	-0.18	0.01	1.58	0.69	0.18	0.06	-0.64	-0.67	-0.74	-0.54

Table B3.2. Annual scores for the political violence index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Honduras	-0.80	-0.69	-0.71	-0.64	-0.37	-0.36	-0.49	-0.50	-0.36	-0.44	0.29	-0.19	-0.33
Hong Kong													
Hungary	-1.42	-1.25	-1.21	-1.04	-1.10	-0.94	-1.12	-1.11	-0.95	-1.19	-1.19	-1.08	-1.06
Iceland													
India	10.46	9.62	10.31	11.48	11.26	11.51	10.21	10.19	10.01	10.51	10.48	9.73	7.90
Indonesia	0.55	5.75	3.61	3.57	3.32	3.18	3.01	-0.16	-0.04	0.01	0.17	-0.01	0.04
Iran	1.15	0.50	1.32	0.52	0.23		1.30		1.48	1.62	1.60	1.61	1.61
Iraq	6.77	4.87	1.18	1.02									
Ireland	-1.33	-1.47	-1.50	-1.50	-1.34	-1.22	-1.37	-1.37	-1.21	-1.22	-1.41	-1.38	-1.21
Israel	4.32	3.72	3.86	4.62	4.46	4.49	4.05	4.84	4.11	4.37	4.46	3.49	3.80
Italy	-1.24	-1.40	-1.30	-1.13	-1.14	-1.16	-1.11	-1.33	-1.00	-1.16	-0.70	-1.16	-1.04
Jamaica	-1.06	-0.61	-0.73	-0.56	-0.27	-0.29	-0.41	-0.42	-0.42	-0.24	-0.29	0.02	-0.33
Japan	-1.11	-1.40	-1.42	-1.16	-1.16	-1.31	-1.47	-1.60	-1.46	-1.45	-1.48	-1.18	-1.32
Jersey, Channel Isl.													
Jordan	-0.48	-0.45	-0.28	-0.46	-0.60	-0.44	-0.44	-0.18	-0.17	0.14	-0.03	0.01	0.00
Kazakhstan		-0.52	-0.23	-0.40	-0.38	-0.24	-0.25	-0.27	-0.05	-0.24	-0.26	-0.10	0.19
Kenya	-0.05	0.06	0.15	0.44	0.17	-0.22	0.08	0.47	0.69	2.10	1.96	-0.04	-0.31
Kiribati													
Korea, Dem. Rep.													
Korea, Rep.	-0.28	-0.76	-0.59	-0.16	-0.66	-0.66	-0.79	-0.83	-0.80	-0.64	-0.70	-1.00	-0.83
Kosovo													
Kuwait	-0.01	-0.53	-0.59	-0.65	-0.62	-0.63	-0.47	-0.78	-0.63	-0.72	-0.72	-0.65	-0.53
Kyrgyz Rep.		-0.97	-0.58	-0.63	-0.74	-0.49	-0.64	-0.23	-0.26	-0.91	-0.38	0.93	0.05
Lao	-1.46	-0.55	-0.18	-0.32	0.26	-0.03	0.00	-0.13	-0.11	-0.73	-0.59	-0.72	-0.54
Latvia	-1.14	-0.93	-1.36	-1.33	-1.33	-1.20	-1.02	-1.20	-1.05	-0.78	-1.03	-0.97	-0.84
Lebanon				-0.38	-0.17	-0.18	-0.23	-0.49	0.38	0.14	-0.45	-0.34	-0.18
Lesotho	-1.25		-1.07	-1.13	-0.99	-1.14	-0.97	-0.98	-0.75	-1.04	-1.36	-1.09	-1.31
Liberia											-0.65	-0.64	-0.89
Libya	0.23	0.28	-0.16										
Liechtenstein													
Lithuania	-1.26	-1.43	-1.38	-1.41	-1.38	-1.36	-1.31	-1.20	-1.34	-1.30	-1.22	-1.20	-1.15
Luxembourg	-1.52	-1.51	-1.56	-1.59	-1.56	-1.58	-1.55	-1.58	-1.55	-1.57	-1.56	-1.53	-1.54
Macao													
Macedonia				-0.55	-0.82	-0.95	-0.80	-0.81	-0.81	-1.06	-1.08	-0.92	-0.63
Madagascar	-1.16	-1.18	-1.15	-0.07	-0.79	-0.91	-0.57	-0.78	-0.97	-0.76	0.26	-0.36	-0.11
Malawi	-0.63	-1.05	-1.06	-0.63	-0.38	-0.71	-0.58	-0.43	-0.52	-0.53	-0.89	-0.74	-0.55
Malaysia	-0.77	-0.17	-0.03	-0.47	-0.31	-0.18	-0.28	-0.17	-0.17	-0.27	-0.48	-0.45	-0.01
Maldives													
Mali	-1.63	-0.99	-1.15	-1.27	-1.10	-1.26	-1.14	-1.00	-0.07	-0.01	0.66	-0.97	-1.15
Malta													
Marshall Islands													
Martinique													
Mauritania	-1.17	-0.89	-0.77	-0.67	-0.79	-0.67	-0.46	-0.58	-0.48	-0.63	-0.43	0.15	0.62
Mauritius			-0.85	-1.14	-1.27	-0.98	-0.98	-0.68	-0.83	-0.80	-0.82	-0.84	-0.95
Mexico	1.54	-0.13	0.03	0.03	-0.07	-0.10	-0.07	1.61	2.32	3.02	3.24	3.52	3.62
Micronesia													
Moldova	-0.73	-1.23	-0.75	-0.87	-0.52	-0.43	-0.53	-0.58	-0.71	-0.53	-0.24	-0.41	-0.58
Monaco													
Mongolia	-1.28	-0.98	-1.29	-1.12	-0.78	-0.63	-0.73	-0.50	-0.51	-0.33	-0.80	-0.82	-0.81
Montenegro											-1.02	-1.22	-1.19
Morocco	-0.04	-0.66	-0.19	-0.45	-0.33	-0.30	0.02	-0.18	-0.12	-0.11	-0.26	-0.13	0.02
Mozambique	-0.41	-0.40	-0.14	-0.60	-0.71	-0.31	-0.54	-0.52	-0.33	-0.43	-0.48	-0.32	-0.45
Myanmar	5.93	5.46	6.73	4.86	4.67	4.52	6.89	6.40	6.89	5.57	6.59	5.96	6.60
Namibia		-0.67	-0.65	-0.29	-0.76	-0.87	-0.97	-0.80	-0.92	-1.04	-1.24	-0.95	-0.71
Nauru													
Nepal	2.25	3.22	3.45	3.92	3.94	4.21	4.46	4.02	0.12	0.42	0.32	0.23	-0.11
Netherlands	-1.53	-1.51	-1.51	-1.51	-1.55	-1.54	-1.59	-1.65	-1.62	-1.49	-1.49	-1.52	-1.66
N. Antilles													
New Caledonia													
New Zealand	-1.53	-1.55	-1.56	-1.42	-1.41	-1.42	-1.44	-1.45	-1.45	-1.62	-1.61	-1.62	-1.62
Nicaragua	-0.54	-0.51	-0.84	-0.67	-0.56	-0.86	-0.71	-0.84	-1.12	-0.71	-0.63	-0.43	-0.43
Niger	-0.56	-0.20	-0.97	-1.10	-0.78	-0.76	-0.94	-0.82	0.46	0.66	-0.40	-0.76	-0.60
Nigeria	0.24	0.33	0.66	1.98	1.96	3.73	0.84	1.43	1.62	2.20	5.39	4.62	3.79
Niue													
Norway	-1.60	-1.64	-1.59	-1.63	-1.66	-1.64	-1.60	-1.62	-1.60	-1.44	-1.62	-1.60	-1.60
Oman	-0.74	-0.75	-0.92	-1.21	-0.95	-1.27	-0.67	-1.13	-1.27	-1.11	-1.09	-1.09	-0.39
Pakistan	3.13		0.47	0.95	1.13	4.40	4.19	5.09	6.62	7.34	7.80	7.14	7.59
Palau													
Panama	-0.94	-1.23	-1.01	-1.62	-1.16	-1.18	-1.29	-1.47	-1.40	-1.13	-1.46	-0.56	-1.30
Papua New Guinea	2.07	-1.06	-1.06								-0.57	-0.57	-0.75
Paraguay	-1.11	-0.45	-0.74	-0.49	-0.73	-0.74	-0.73	-0.27	-0.44	-0.40	-0.94	-0.80	-0.81
Peru	3.50	0.50	-0.27	-0.34	-0.16	-0.33	-0.60	-0.47	-0.29	-0.01	0.19	0.23	-0.55
Philippines	5.39	4.19	6.46	4.20	4.50	4.69	4.68	4.78	4.41	4.73	4.69	4.69	4.71
Poland													
Portugal	-1.42	-1.42	-1.32	-1.16	-1.17	-1.18	-1.19	-1.18	-1.18	-1.15	-1.17	-1.15	-1.15
Puerto Rico													
Qatar					-1.31	-1.32	-0.95	-0.82	-0.46	-1.06	-1.05	-1.14	-0.83
Réunion													
Romania	-1.03	-0.90	-0.63	-0.78	-0.96	-0.59	-0.73	-0.59	-0.60	-0.43			
Russian Federation	4.71	0.36	5.23	3.91	4.26	4.77	4.28	3.61	2.16	2.23	3.15	2.83	2.98
Rwanda		4.63	1.17	1.06	0.23	0.27	-0.39	-0.49	-0.47	-0.59	0.47	0.59	0.74

Table B3.2. Annual scores for the political violence index

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Samoa													
San Marino													
S. Tome & Principe													
Saudi Arabia	0.11	0.11	-0.17	-0.18	0.28	0.43	0.29	0.43	0.73	0.34	0.59	0.30	0.61
Senegal	1.39	2.91	0.34	-0.59	0.07	-1.07	-0.73	-0.46	-0.38	-0.53	-0.36	-0.37	0.35
Serbia											-0.99	-1.09	-1.08
Seychelles													
Sierra Leone	3.34				-0.41	-0.83	-0.71	-0.62	-0.73	-0.71		-0.63	-0.91
Singapore	-0.58	-0.76	-0.72	-0.69	-0.82	-0.66	-0.53	-0.54	-0.84	-0.95	-0.99	-0.86	-1.01
Slovak Rep.	-1.28	-1.43	-1.07	-1.10	-1.26	-1.15	-1.57	-1.09	-1.10	-1.18	-1.23	-1.21	-1.21
Slovenia		-1.57	-1.26	-1.59	-1.28	-1.46	-1.44	-1.43	-1.44	-1.55	-1.64	-1.49	-1.61
Solomon Islands											-1.75	-1.72	-1.74
Somalia													
South Africa	2.77	-0.05	-0.35	-0.46	-0.32	-0.46	-0.29	-0.29	0.18	0.02	0.01	-0.02	-0.31
South Sudan													
Spain	-0.67	-0.96	-0.81	-0.48	-0.33	-0.67	-0.62	-0.49	-0.34	-0.51	-0.68	-0.98	-0.96
Sri Lanka	5.75	5.49	5.72	3.73	3.73	3.34	4.56	5.65	5.90	6.15	6.36	0.85	0.95
St. Kitts & Nevis													
St. Lucia													
St. Vincent & Gren.													
Sudan	6.66	6.97	7.14										
Suriname					-1.05	-0.80	-0.90	-0.89	-0.88	-1.16	-1.21	-1.05	-0.91
Swaziland	-0.79	-0.77	-0.59	-0.91	-0.91	-0.79	-0.53	-0.61	-0.42	-0.28	-0.28	-0.30	-0.31
Sweden	-1.62	-1.62	-1.47	-1.43	-1.44	-1.57	-1.43	-1.43	-1.40	-1.41	-1.43	-1.41	-1.42
Switzerland	-1.53	-1.50	-1.36	-1.20	-1.09	-1.08	-1.22	-1.20	-1.03	-1.05	-1.22	-1.40	-1.37
Syrian Arab Rep.	0.08	0.07	0.22	-0.09	0.05	0.07	0.09	0.23	0.41	0.72	0.57	0.57	6.75
Taiwan													
Tajikistan		3.51	0.87	-0.17	-0.43	-0.45	-0.31	-0.21	-0.16	-0.27	-0.42	0.36	0.46
Tanzania	-0.33	-0.27	0.00	-0.72	-0.27	-0.19	-0.05	-0.58	-0.62	-0.41	-0.75	-0.59	-0.44
Thailand	-0.39	-0.68	-0.45	-0.48	1.07	2.20	2.84	2.59	2.65	2.51	2.39	2.81	2.59
Timor-Leste											-1.14	-1.24	-1.21
Togo			-0.50	-0.61	-0.38	-0.24	0.24	-0.09	-0.23	-0.58	-0.47	-0.25	-0.45
Tonga													
Trinidad & Tobago	-1.13	-1.27	-1.27	-1.04	-0.89	-0.74	-0.60	-0.71	-0.72	-0.64	-0.70	-0.74	-0.72
Tunisia	-0.62	-0.12	0.02	-0.32	-0.09	-0.12	-0.12	0.03	-0.06	0.10	-0.03	0.10	-0.23
Turkey	4.75	4.51	2.13	1.05	0.78	2.54	3.66	2.66	3.15	3.21	3.08	2.81	2.96
Turkmenistan		-0.46	-0.29	-0.39	0.06	0.02	-0.09	0.02	-0.08	-0.21	-0.22	-0.09	0.05
Tuvalu													
Uganda	3.19	2.82	2.92	3.25	3.40	3.38	3.51	3.45	1.09	1.02	1.12	1.08	1.00
Ukraine	-0.85	-0.51	-0.36	-0.50	-0.08	-0.22	-0.57	-0.56	-0.25	-0.25	-0.44	-0.47	-0.33
Un. Arab Emirates	-0.81	-0.51	-0.75	-0.37	-0.81	-0.51	-0.53	-0.68	-0.55	-0.68	-0.85	-0.69	-0.71
United Kingdom	-1.32	-0.22	-1.04	-1.06	-1.11	-1.12	-0.67	-1.14	-1.09	-1.10	-1.02	-1.44	-1.46
United States	-1.36	-1.35	-1.35	-0.15	-0.16	0.43	0.43	0.42	0.28	0.12	0.23	0.08	0.10
Uruguay	-1.49	-1.09	-1.12	-1.28	-1.10	-1.05	-1.20	-1.53	-1.55	-1.55	-1.42	-1.26	-1.43
Uzbekistan		-0.24	0.86	0.22	0.37	1.19	0.70	0.07	-0.04	-0.04	0.09	-0.06	0.05
Vanuatu													
Venezuela	0.45	-0.12	-0.38	-0.23		0.09	0.09	0.21	0.25				
Vietnam	-0.54	-0.36	-0.22	-0.22	-0.07	0.09	-0.19	-0.22	-0.10	0.22	-0.24	-0.10	-0.09
Virgin Islands													
West Bank & Gaza													
Yemen	0.05	0.05	0.15	-0.26	0.15	1.87	1.58	1.43	1.56	1.90	2.05	2.37	3.02
Zambia	-0.35	-0.17	-0.57	-0.54	-0.51	-0.35	-0.30	-0.38	-0.58	-0.32	-0.31	-0.04	-0.35
Zimbabwe													

Table B3.3. Comparison of the rankings obtained with different applications of PCA

Country	1993-2002				2003-2012			
	State effectiveness ranks		Political violence ranks		State effectiveness ranks		Political violence ranks	
	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2
Afghanistan	..	..	4	..	..	..	..	13
Albania	50	70	47	48	78	67	108	90
Algeria	51	9	11	47	50	55	22	26
Angola	3	2	3	4	7	7	33	33
Argentina	99	71	58	97	83	77	105	57
Armenia	69	64	147	65	71	75	57	113
Australia	137	127	114	132	145	144	135	115
Austria	147	120	141	135	147	149	130	111
Azerbaijan	20	33	29	22	26	28	34	56
Bahrain	106	51	130	96	113	114	88	160
Bangladesh	32	42	62	28	17	23	26	32
Belarus	39	56	152	37	29	37	54	147
Belgium	135	135	132	130	141	140	144	126
Benin	63	113	129	69	58	48	100	104
Bhutan	..	..	138	..	108	111	71	162
Bolivia	76	92	80	81	61	50	101	80
Bosnia	59	104	109	57	80	80	118	155
Botswana	118	114	128	112	125	125	114	130
Brazil	92	43	43	83	90	98	36	38
Bulgaria	94	72	83	85	102	103	103	84
Burkina Faso	35	80	76	43	68	59	96	74
Burundi	10	5	8	11	23	24	30	23
Cambodia	17	46	36	16	21	19	45	60
Cameroon	24	38	64	19	20	21	39	86
Canada	140	132	125	136	148	147	141	122
Cape Verde	101	..	139	..	117	115	128	101
Central African Rep.	26	27	65	29	9	10	14	19
Chad	18	30	31	13	5	6	15	17
Chile	129	82	67	124	137	136	111	103
China	48	21	33	35	33	62	23	36
Colombia	81	8	10	78	84	85	4	5
Comoros	..	..	134	..	42	22	146	148
Congo, Dem. Rep.	..	..	2	..	1	2	7	7
Congo, Rep.	13	20	27	20	22	13	73	67
Costa Rica	117	134	111	114	121	120	139	127
Côte d'Ivoire	43	25	45	40	8	8	18	24
Croatia	96	98	35	89	115	112	136	145
Cuba	47	50	116	39	51	69	63	158
Cyprus	125	110	135	120	133	133	112	119
Czech Rep.	123	130	126	118	129	128	138	143
Denmark	150	141	112	145	155	155	151	139
Djibouti	40	..	150	..	65	61	99	123
Dominican Rep.	60	57	54	55	53	56	48	49
Ecuador	49	77	70	49	41	38	68	63
Egypt	82	24	28	70	62	78	27	39
El Salvador	72	96	63	80	86	84	79	50
Equatorial Guinea	2	..	137	..	4	5	40	108
Eritrea	..	..	74	..	..	..	..	55
Estonia	122	128	99	119	134	132	134	121
Ethiopia	15	19	24	21	28	27	10	14
Fiji	95	116	146	91	76	73	106	149
Finland	148	142	123	143	153	154	147	135
France	134	122	96	129	139	139	127	107
Gabon	68	103	145	66	59	54	80	133
Gambia	70	89	154	68	69	64	74	76
Georgia	29	48	37	31	74	79	44	46
Germany	146	138	143	137	144	146	145	157
Ghana	73	94	86	77	94	95	82	66
Greece	121	107	110	115	118	121	97	97

Table B3.3. Comparison of the rankings obtained with different applications of PCA

Country	1993-2002 State effectiveness ranks		1993-2002 Political violence ranks		2003-2012 State effectiveness ranks		2003-2012 Political violence ranks	
	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2
Guatemala	64	32	22	58	63	53	77	51
Guinea	21	35	46	15	10	12	55	116
Guinea-Bissau	11	109	48	18	16	9	117	156
Guyana	85	105	81	87	91	86	90	62
Haiti	5	66	53	5	6	4	38	34
Honduras	61	86	59	63	57	58	62	47
Hungary	126	121	104	122	130	129	122	96
India	78	1	1	94	99	82	1	1
Indonesia	36	13	19	36	36	41	24	28
Iran	28	28	38	14	14	30	21	29
Iraq	1	12	18	1	..	..	..	10
Ireland	136	136	131	131	142	141	140	134
Israel	128	10	12	117	127	131	6	8
Italy	124	125	88	121	122	124	123	91
Jamaica	100	90	55	101	96	100	60	43
Japan	130	126	95	127	138	138	143	110
Jordan	107	65	142	98	101	110	52	131
Kazakhstan	33	61	144	34	39	47	51	137
Kenya	37	39	51	32	30	34	28	31
Korea, Dem. Rep.	..	..	52	..	..	..	..	48
Korea, Rep.	114	68	72	108	126	127	102	94
Kosovo	..	..	..	..	..	..	..	146
Kuwait	112	67	153	103	107	107	85	161
Kyrgyz Rep.	41	87	149	44	40	44	61	85
Lao	9	79	158	9	11	11	59	150
Latvia	103	117	105	104	119	118	119	128
Lebanon	75	59	75	67	70	70	50	65
Lesotho	90	111	98	92	104	101	121	88
Liberia	..	..	26	..	37	29	98	40
Libya	6	40	100	2	..	..	..	37
Lithuania	113	131	127	110	123	122	137	154
Luxembourg	143	144	121	140	149	145	152	141
Macedonia	83	74	61	82	95	94	107	93
Madagascar	46	99	73	53	49	45	78	102
Malawi	62	95	90	64	89	88	81	61
Malaysia	108	58	148	102	106	108	56	153
Mali	45	124	42	59	67	46	92	41
Mauritania	52	97	122	50	31	31	66	75
Mauritius	119	106	93	113	124	123	109	82
Mexico	87	36	39	79	87	91	19	20
Moldova	89	100	66	88	77	81	76	105
Mongolia	86	112	103	90	79	74	89	69
Montenegro	..	..	..	..	103	97	125	100
Morocco	79	55	140	71	56	65	46	89
Mozambique	31	62	56	38	35	36	72	77
Myanmar	4	4	7	3	2	1	2	2
Namibia	111	73	68	106	112	105	110	87
Nepal	57	15	21	51	45	49	17	22
Netherlands	144	140	123	142	152	151	153	136
New Zealand	145	139	118	141	154	153	150	132
Nicaragua	56	81	57	56	60	51	94	79
Niger	22	85	44	26	38	33	70	54
Nigeria	14	31	41	10	19	18	11	16
Norway	149	145	136	144	151	150	154	144
Oman	104	101	162	95	109	106	116	164
Pakistan	38	22	32	30	34	35	3	4
Panama	98	118	97	100	105	99	132	118
Papua New Guinea	54	45	34	62	43	32	84	53
Paraguay	34	84	71	41	48	40	87	70

Table B3.3. Comparison of the rankings obtained with different applications of PCA

Country	1993-2002				2003-2012			
	State effectiveness ranks		Political violence ranks		State effectiveness ranks		Political violence ranks	
	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2	PCA1	PCA2
Peru	77	29	23	75	85	83	53	35
Philippines	88	7	5	93	72	66	5	6
Poland	..	..	117	..	..	..	..	125
Portugal	131	129	101	128	135	134	126	78
Qatar	105	..	160	..	116	117	115	165
Romania	71	93	92	72	88	90	86	106
Russian Federation	66	11	15	61	52	63	9	12
Rwanda	25	18	13	25	66	72	37	44
Saudi Arabia	93	47	151	73	73	89	29	71
Senegal	74	26	25	76	75	71	67	45
Serbia	..	..	..	..	97	93	120	112
Sierra Leone	16	14	16	8	25	17	93	95
Singapore	133	83	159	125	136	137	104	163
Slovak Rep.	110	119	119	109	120	119	133	129
Slovenia	127	137	133	123	131	130	149	138
Solomon Islands	..	..	40	..	92	76	155	117
South Africa	109	34	30	105	111	113	49	42
South Sudan	..	..	..	..	..	..	..	11
Spain	132	88	60	126	132	135	83	58
Sri Lanka	91	6	9	86	82	87	8	9
Sudan	8	3	6	6	..	..	..	3
Suriname	80	..	78	..	98	92	113	91
Swaziland	67	91	155	60	64	68	75	140
Sweden	139	143	115	138	150	152	148	142
Switzerland	141	133	120	139	146	148	129	120
Syrian Arab Rep.	42	41	107	33	27	39	25	30
Taiwan	..	..	108	..	..	..	..	159
Tajikistan	7	23	20	7	18	14	47	72
Tanzania	44	53	106	42	44	43	69	114
Thailand	102	69	85	99	93	102	13	18
Timor-Leste	..	..	102	..	46	25	131	81
Togo	19	75	91	23	15	15	58	98
Trinidad & Tobago	115	115	89	111	114	109	95	59
Tunisia	84	52	82	74	81	96	41	109
Turkey	97	16	14	84	100	104	12	15
Turkmenistan	12	60	156	12	3	3	42	151
Uganda	58	17	17	52	47	52	16	21
Ukraine	53	76	113	46	55	60	65	73
Un. Arab Emirates	116	78	161	107	110	116	91	166
United Kingdom	142	102	69	134	143	143	124	83
United States	138	108	77	133	140	142	32	27
Uruguay	120	123	94	116	128	126	142	124
Uzbekistan	27	37	79	24	13	20	31	99
Venezuela	55	49	49	45	24	26	35	52
Vietnam	30	54	157	27	32	42	43	152
Yemen	23	44	50	17	12	16	20	25
Zambia	65	63	84	54	54	57	64	64
Zimbabwe	..	..	87	..	..	..	..	68

Notes: PCA1 corresponds to the rankings obtained when PCA was applied separately to the variables for state effectiveness and the proxies for political violence. PCA2 lists the rankings obtained with the first two principal components derived from applying PCA to all the variables used in the analysis.

Table B3.4. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 1993-2002

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
Cluster 3 Lowest SE + Highest PV	Azerbaijan	19	-2.909	31	0.499
	Guinea-Bissau	15	-2.999	106	-1.059
	Côte d'Ivoire	37	-1.874	23	1.134
	Burundi	8	-3.307	4	5.651
	Sierra Leone	5	-3.429	12	3.340
	Angola	2	-3.688	2	7.733
Cluster 2 High levels of repression and civil conflict	Uganda	49	-1.201	15	3.042
	Indonesia	33	-2.096	11	3.373
	Russian Federation	58	-0.973	10	3.552
	Turkey	81	0.032	14	3.112
	Pakistan	27	-2.239	20	1.518
	Senegal	73	-0.393	24	1.015
	Guatemala	55	-1.042	30	0.607
	Peru	72	-0.409	27	0.847
	China	32	-2.147	19	1.645
	Rwanda	22	-2.829	16	2.286
	Congo, Rep.	17	-2.972	18	2.012
	Nepal	48	-1.263	13	3.209
	Egypt	67	-0.593	22	1.195
	Sri Lanka	83	0.165	5	5.175
	Philippines	90	0.449	6	5.060
	Tajikistan	4	-3.462	21	1.403
	Israel	114	2.820	9	4.131
	Myanmar	1	-3.855	3	5.745
	Algeria	44	-1.406	8	4.355
	Colombia	75	-0.333	7	4.906
	India	91	0.516	1	10.467
Cluster 1 Intermediate levels	Ghana	74	-0.371	91	-0.838
	Bolivia	78	-0.202	89	-0.788
	Gabon	63	-0.662	100	-0.912
	Romania	69	-0.488	90	-0.834
	Bulgaria	82	0.101	69	-0.532
	Nicaragua	53	-1.091	78	-0.642
	Malawi	61	-0.850	92	-0.842
	Moldova	85	0.224	97	-0.894
	El Salvador	77	-0.257	93	-0.860
	Ecuador	46	-1.341	74	-0.600
	Lebanon	64	-0.656	56	-0.375
	Ukraine	43	-1.418	73	-0.556
	Dominican Rep.	52	-1.112	54	-0.346
	Guyana	84	0.191	102	-0.967
	Tanzania	39	-1.842	50	-0.330
	Kyrgyz Rep.	41	-1.671	84	-0.726
	Honduras	60	-0.863	83	-0.708
	Albania	45	-1.376	67	-0.521
	Morocco	68	-0.554	52	-0.336
	Argentina	94	0.666	68	-0.521
	Tunisia	71	-0.453	49	-0.259
	Kazakhstan	31	-2.195	58	-0.384
	Benin	66	-0.596	110	-1.174
	Panama	97	0.801	115	-1.202
	Burkina Faso	40	-1.675	77	-0.634
	Venezuela	42	-1.529	46	-0.068
	Bangladesh	25	-2.403	39	0.049
	Mexico	76	-0.305	34	0.367
	Brazil	80	-0.002	40	0.002
	Mongolia	87	0.314	109	-1.166
	Latvia	101	1.152	114	-1.193
	Jamaica	98	0.875	87	-0.741

Table B3.4. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 1993-2002

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
	Lesotho	89	0.412	108	-1.152
	Georgia	28	-2.237	45	-0.036
	Armenia	62	-0.831	61	-0.414
	Jordan	95	0.672	62	-0.418
	Bahrain	93	0.643	48	-0.223
	Swaziland	57	-0.993	88	-0.766
	Syrian Arab Rep.	30	-2.203	38	0.071
	Mauritania	47	-1.277	94	-0.876
	Zambia	51	-1.193	60	-0.406
	Mali	56	-1.039	121	-1.260
	Madagascar	50	-1.201	96	-0.889
	Kenya	29	-2.236	37	0.151
	Saudi Arabia	70	-0.454	44	-0.034
	Malaysia	99	0.888	55	-0.360
	Paraguay	38	-1.861	81	-0.696
	Togo	20	-2.873	72	-0.555
	Uzbekistan	21	-2.870	35	0.282
	Namibia	103	1.241	70	-0.538
	Macedonia	79	-0.169	71	-0.550
	Cameroon	16	-2.980	36	0.237
	Croatia	86	0.289	95	-0.886
	Niger	23	-2.532	82	-0.705
	Belarus	34	-2.081	53	-0.341
	Yemen	14	-3.008	41	-0.001
	Mozambique	35	-2.080	59	-0.387
	Kuwait	100	1.053	64	-0.445
	Slovak Rep.	106	1.572	116	-1.220
	Oman	92	0.552	98	-0.905
	Guinea	12	-3.016	33	0.401
	Central African Rep.	26	-2.385	25	0.970
	Turkmenistan	9	-3.221	57	-0.381
	Vietnam	24	-2.507	51	-0.335
	Fiji	88	0.385	113	-1.181
	Papua New Guinea	59	-0.907	42	-0.015
	South Africa	102	1.212	32	0.475
	Gambia	65	-0.629	86	-0.738
	Lao	6	-3.375	76	-0.626
	Haiti	3	-3.680	63	-0.439
	Cuba	36	-2.058	47	-0.195
	Nigeria	7	-3.324	29	0.804
	Un. Arab Emirates	104	1.470	75	-0.609
	Chad	10	-3.082	28	0.846
	Iran	11	-3.022	26	0.874
	Cambodia	13	-3.012	43	-0.021
	Ethiopia	18	-2.958	17	2.132
	Bosnia	54	-1.070	101	-0.929
Cluster 4 Highest SE + Lowest PV	Thailand	96	0.731	66	-0.500
	Singapore	122	3.578	80	-0.686
	Korea, Rep.	105	1.565	65	-0.447
	Mauritius	110	2.239	103	-0.997
	Trinidad & Tobago	108	2.144	112	-1.178
	Lithuania	107	1.872	128	-1.370
	Costa Rica	111	2.283	131	-1.398
	Chile	121	3.205	79	-0.654
	Botswana	109	2.219	111	-1.176
	Cyprus	117	2.925	107	-1.074
	Greece	112	2.477	104	-1.053
	Uruguay	113	2.556	120	-1.243
	Germany	134	4.996	135	-1.488
	Norway	141	5.351	142	-1.615

Table B3.4. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 1993-2002

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
	France	126	3.979	119	-1.234
	Estonia	116	2.859	125	-1.315
	Denmark	142	5.447	138	-1.521
	Czech Rep.	115	2.849	127	-1.332
	Slovenia	120	3.189	134	-1.474
	Spain	123	3.594	85	-0.731
	Italy	118	2.938	122	-1.267
	Sweden	135	5.008	140	-1.536
	Finland	140	5.328	139	-1.527
	Austria	132	4.900	117	-1.227
	Hungary	119	3.004	118	-1.230
	Netherlands	139	5.201	137	-1.514
	New Zealand	138	5.193	136	-1.514
	United Kingdom	131	4.840	99	-0.908
	Switzerland	136	5.012	130	-1.394
	Luxembourg	137	5.190	141	-1.545
	Canada	133	4.994	129	-1.393
	Japan	124	3.621	123	-1.272
	Portugal	125	3.662	126	-1.330
	Ireland	128	4.582	133	-1.449
	United States	130	4.603	105	-1.053
	Australia	129	4.598	124	-1.314
	Belgium	127	4.392	132	-1.444

Notes: Total number of countries: 148. For consistency in the presentation of the results, countries are ranked from 1-148 from the lowest to the highest levels of state effectiveness (i.e. from the highest to the lowest levels of state ineffectiveness) in the third column, and from the highest to the lowest levels of political violence in the fifth column.

Table B3.5. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 2003-2012

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
Cluster 2	Sri Lanka	79	-0.512	8	4.165
Low levels of	Russian Federation	49	-1.635	9	3.364
state	Philippines	69	-0.955	5	4.653
effectiveness +	Pakistan	34	-2.207	3	5.700
Highest levels of	Turkey	95	0.314	12	2.761
political violence	Thailand	89	-0.101	13	2.406
	Israel	120	2.471	6	4.230
	Myanmar	2	-4.437	2	6.011
	Congo, Dem. Rep.	1	-4.531	7	4.221
	India	94	0.223	1	10.200
Cluster 1	Gambia	66	-1.206	73	-0.477
Low levels of	Dominican Rep.	50	-1.576	48	-0.161
state	Honduras	54	-1.488	62	-0.307
effectiveness	Nicaragua	57	-1.402	93	-0.701
	Ukraine	52	-1.505	65	-0.352
	Lebanon	67	-1.193	50	-0.169
	Bolivia	58	-1.401	99	-0.758
	Paraguay	45	-1.794	86	-0.651
	Benin	55	-1.467	98	-0.740
	Morocco	53	-1.489	46	-0.154
	Gabon	56	-1.443	79	-0.563
	Guatemala	60	-1.332	76	-0.519
	Kazakhstan	38	-2.013	51	-0.177
	Senegal	72	-0.894	67	-0.385
	Mongolia	76	-0.724	88	-0.658
	Djibouti	62	-1.314	97	-0.729
	Armenia	68	-1.024	57	-0.273
	Burkina Faso	65	-1.235	95	-0.719
	Moldova	74	-0.816	75	-0.506
	Kyrgyz Rep.	39	-2.010	61	-0.295
	Ecuador	40	-2.000	68	-0.428
	Congo, Rep.	22	-2.907	72	-0.457
	Cameroon	20	-2.945	39	-0.013
	Albania	75	-0.797	106	-0.877
	El Salvador	83	-0.349	78	-0.561
	Romania	85	-0.228	85	-0.649
	Georgia	71	-0.909	44	-0.121
	Ghana	90	-0.034	81	-0.595
	Azerbaijan	26	-2.680	34	0.178
	Zambia	51	-1.532	64	-0.350
	Peru	82	-0.395	53	-0.222
	Tajikistan	18	-3.085	47	-0.161
	Indonesia	36	-2.139	24	1.058
	Cambodia	21	-2.934	45	-0.149
	Tanzania	42	-1.973	69	-0.433
	Fiji	73	-0.856	104	-0.835
	Venezuela	24	-2.790	35	0.157
	Rwanda	63	-1.312	37	0.041
	Vietnam	32	-2.331	43	-0.077
	Swaziland	61	-1.322	74	-0.494
	Guyana	88	-0.189	89	-0.665
	Macedonia	91	0.044	105	-0.874
	Tunisia	78	-0.529	41	-0.045
	Argentina	80	-0.502	103	-0.815
	Belarus	29	-2.490	54	-0.226
	Bulgaria	97	0.351	101	-0.790
	Kenya	30	-2.418	28	0.545
	Egypt	59	-1.384	27	0.667
	Sierra Leone	25	-2.713	92	-0.694

Table B3.5. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 2003-2012

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
	Lao	11	-3.356	59	-0.288
	Mozambique	35	-2.158	71	-0.455
	Brazil	87	-0.209	36	0.045
	Togo	15	-3.160	58	-0.273
	Jamaica	92	0.115	60	-0.294
	Algeria	47	-1.725	22	1.329
	Suriname	93	0.210	111	-0.983
	Uzbekistan	13	-3.209	31	0.258
	Bosnia	77	-0.608	116	-1.030
	Niger	37	-2.076	70	-0.438
	Malawi	86	-0.227	80	-0.594
	Saudi Arabia	70	-0.941	29	0.445
	Jordan	96	0.334	52	-0.189
	Panama	99	0.410	127	-1.216
	Bangladesh	17	-3.090	26	0.685
	Angola	7	-3.633	33	0.189
	Madagascar	46	-1.750	77	-0.555
	South Africa	104	0.822	49	-0.166
	Burundi	23	-2.848	30	0.419
	Syrian Arab Rep.	27	-2.663	25	1.050
	Namibia	105	0.855	108	-0.918
	Uganda	44	-1.827	16	2.116
	Turkmenistan	3	-4.320	42	-0.060
	China	33	-2.214	23	1.138
	Equatorial Guinea	4	-4.158	40	-0.042
	Trinidad & Tobago	107	1.105	94	-0.716
	Lesotho	98	0.405	118	-1.070
	Croatia	108	1.252	131	-1.274
	Iran	14	-3.176	21	1.350
	Nepal	43	-1.962	17	1.957
	Cuba	48	-1.659	63	-0.342
	Mali	64	-1.254	91	-0.671
	Cape Verde	110	1.500	124	-1.176
	Papua New Guinea	41	-1.974	83	-0.630
	Guinea	10	-3.374	55	-0.257
	Mauritania	31	-2.373	66	-0.362
	Nigeria	19	-3.077	11	2.843
	Central African Rep.	9	-3.385	14	2.370
	Yemen	12	-3.311	20	1.770
	Mexico	84	-0.263	19	1.901
	Ethiopia	28	-2.593	10	2.941
	Chad	5	-3.834	15	2.353
	Haiti	6	-3.717	38	-0.008
	Colombia	81	-0.410	4	4.975
	Guinea-Bissau	16	-3.090	115	-0.998
	Côte d'Ivoire	8	-3.403	18	1.932
Cluster 3 Highest levels of state effectiveness + Lowest levels of political violence	Un. Arab Emirates	103	0.780	90	-0.667
	Malaysia	100	0.453	56	-0.259
	Singapore	129	3.513	102	-0.800
	Kuwait	101	0.644	84	-0.640
	Bahrain	106	0.899	87	-0.651
	Oman	102	0.763	114	-0.997
	Qatar	109	1.313	113	-0.994
	United States	133	4.271	32	0.213
	Denmark	148	5.754	145	-1.539
	Greece	111	1.662	96	-0.721
	Slovak Rep.	113	1.895	128	-1.223
	Latvia	112	1.674	117	-1.045
	Mauritius	117	2.205	107	-0.906
	Finland	146	5.370	141	-1.418

Table B3.5. Comparison of rankings obtained with cluster analysis and PCA (sample restricted), 2003-2012

Cluster – main characteristic	Country	State effectiveness scores		Political violence scores	
		Rank	Score	Rank	Score
	New Zealand	147	5.395	144	-1.516
	Netherlands	145	5.349	147	-1.569
	Norway	144	5.302	148	-1.596
	Sweden	143	5.296	142	-1.439
	Italy	115	2.119	120	-1.088
	Luxembourg	142	5.084	146	-1.560
	Korea, Rep.	119	2.395	100	-0.768
	Germany	137	4.799	140	-1.388
	Austria	140	4.942	126	-1.194
	Chile	130	3.548	109	-0.932
	Costa Rica	114	2.025	134	-1.285
	Canada	141	5.010	136	-1.323
	Botswana	118	2.284	112	-0.991
	Switzerland	139	4.931	125	-1.186
	Lithuania	116	2.171	132	-1.274
	Cyprus	126	3.342	110	-0.970
	Australia	138	4.871	130	-1.273
	Spain	125	3.205	82	-0.621
	United Kingdom	136	4.740	121	-1.128
	Czech Rep.	122	2.663	133	-1.275
	Uruguay	121	2.626	137	-1.344
	France	132	4.153	123	-1.174
	Ireland	135	4.595	135	-1.305
	Belgium	134	4.415	139	-1.385
	Slovenia	124	3.095	143	-1.482
	Estonia	127	3.414	129	-1.256
	Hungary	123	2.839	119	-1.083
	Japan	131	4.012	138	-1.382
	Portugal	128	3.442	122	-1.169

Notes: Total number of countries: 148. For consistency in the presentation of the results, countries are ranked from 1-148 from the lowest to the highest levels of state effectiveness (i.e. from the highest to the lowest levels of state ineffectiveness) in the third column, and from the highest to the lowest levels of political violence in the fifth column.

Appendix B4. Scores comparison: additional tables

Table B4.1. Comparison of rankings obtained with PCA and CPIA (full sample), 2005-2012

Country	SE index	PV index	CPIA
Afghanistan	..	..	8
Albania	78	110	..
Algeria	49	27	..
Angola	6	33	11
Argentina	83	107	..
Armenia	70	53	79
Australia	145	139	..
Austria	147	133	..
Azerbaijan	27	31	..
Bahrain	113	80	..
Bangladesh	19	25	47
Belarus	31	56	..
Belgium	141	142	..
Benin	56	92	54
Bhutan	109	72	74
Bolivia	61	104	63
Bosnia	81	119	58
Botswana	125	116	..
Brazil	88	36	..
Bulgaria	100	102	..
Burkina Faso	69	95	67
Burundi	23	30	25
Cambodia	22	48	36
Cameroon	21	40	29
Canada	148	137	..
Cape Verde	118	124	78
Central African Rep.	10	12	7
Chad	5	13	6
Chile	137	111	..
China	33	23	..
Colombia	85	4	..
Comoros	41	143	5
Congo, Dem. Rep.	1	7	15
Congo, Rep.	20	81	18
Costa Rica	122	136	..
Côte d'Ivoire	9	22	13
Croatia	116	141	..
Cuba	59	64	..
Cyprus	134	115	..
Czech Rep.	128	140	..
Denmark	155	150	..
Djibouti	68	101	26
Dominica	..	..	71
Dominican Rep.	52	47	..
Ecuador	37	73	..
Egypt	62	24	..
El Salvador	84	83	..
Equatorial Guinea	4	37	..
Eritrea	..	..	3
Estonia	135	135	..
Ethiopia	30	9	46
Fiji	71	100	..
Finland	152	144	..
France	139	132	..
Gabon	54	76	..
Gambia	63	67	35
Georgia	80	55	80
Germany	144	148	..

Table B4.1. Comparison of rankings obtained with PCA and CPIA (full sample), 2005-2012

Country	SE index	PV index	CPIA
Ghana	95	82	76
Greece	117	94	..
Grenada	..	..	61
Guatemala	65	78	..
Guinea	8	50	21
Guinea-Bissau	16	118	9
Guyana	91	99	43
Haiti	7	57	20
Honduras	55	61	59
Hungary	130	123	..
India	97	1	68
Indonesia	40	29	..
Iran	13	19	..
Ireland	142	138	..
Israel	126	8	..
Italy	121	122	..
Jamaica	96	62	..
Japan	138	147	..
Jordan	101	43	..
Kazakhstan	45	49	..
Kenya	29	26	60
Kiribati	..	..	24
Korea, Rep.	127	103	..
Kosovo	..	..	49
Kuwait	107	89	..
Kyrgyz Rep.	47	52	55
Lao	15	69	30
Latvia	119	114	..
Lebanon	66	51	..
Lesotho	106	121	52
Liberia	36	98	22
Lithuania	123	134	..
Luxembourg	149	152	..
Macedonia	94	108	..
Madagascar	42	74	50
Malawi	93	85	41
Malaysia	102	60	..
Maldives	..	..	51
Mali	64	79	56
Marshall Islands	..	..	10
Mauritania	28	58	33
Mauritius	124	106	..
Mexico	87	16	..
Micronesia	..	..	12
Moldova	77	77	65
Mongolia	76	88	45
Montenegro	103	126	..
Morocco	60	46	..
Mozambique	34	71	57
Myanmar	3	3	..
Namibia	112	112	..
Nepal	39	20	40
Netherlands	153	153	..
New Zealand	154	151	..
Nicaragua	57	96	65
Niger	38	65	42
Nigeria	17	14	44
Norway	150	154	..
Oman	111	113	..
Pakistan	35	2	39
Panama	105	131	..

Table B4.1. Comparison of rankings obtained with PCA and CPIA (full sample), 2005-2012

Country	SE index	PV index	CPIA
Papua New Guinea	43	87	34
Paraguay	50	86	..
Peru	86	54	..
Philippines	73	5	..
Portugal	133	127	..
Qatar	115	109	..
Romania	90	84	..
Russian Federation	51	11	..
Rwanda	75	38	64
Samoa	..	..	77
São Tome and Principe	..	..	23
Saudi Arabia	74	28	..
Senegal	72	66	61
Serbia	98	120	..
Sierra Leone	26	97	28
Singapore	136	105	..
Slovak Rep.	120	130	..
Slovenia	131	149	..
Solomon Islands	92	155	17
South Africa	110	45	..
South Sudan	..	..	2
Spain	132	90	..
Sri Lanka	79	6	53
St. Lucia	..	..	75
St. Vincent & the Grenadines	..	..	70
Sudan	..	..	4
Suriname	99	117	..
Swaziland	67	68	..
Sweden	151	145	..
Switzerland	146	129	..
Syrian Arab Rep.	25	21	..
Tajikistan	18	41	37
Tanzania	46	75	72
Thailand	89	15	..
Timor-Leste	48	128	19
Togo	14	59	14
Tonga	..	..	31
Trinidad & Tobago	114	93	..
Tunisia	82	39	..
Turkey	104	10	..
Turkmenistan	2	42	..
Tuvalu	..	..	16
Uganda	44	18	73
Ukraine	58	70	..
United Arab Emirates	108	91	..
United Kingdom	143	125	..
United States	140	32	..
Uruguay	129	146	..
Uzbekistan	12	35	32
Vanuatu	..	..	38
Venezuela	24	34	..
Vietnam	32	44	69
Yemen	11	17	27
Zambia	53	63	48
Zimbabwe	..	..	1

Notes: The rankings for the indices of state effectiveness and political violence consider 155 countries, whereas the ranking for the CPIA only considers 80 countries. The CPIA rankings were obtained after calculating the average of the scores for the period considered. Data for CPIA from the World Databank (World Bank, 2016).

Table B4.2. Comparison of rankings obtained with PCA and FSI (full sample), 2006-2012

Country	SE index	PV index	FSI
Afghanistan	..	..	8
Albania	79	111	115
Algeria	50	26	79
Angola	7	32	52
Antigua & Bermuda	..	..	127
Argentina	82	105	150
Armenia	68	52	107
Australia	145	139	172
Austria	147	134	169
Azerbaijan	26	33	63
Bahamas	..	..	135
Bahrain	112	77	134
Bangladesh	19	27	21
Barbados	..	..	137
Belarus	30	56	68
Belgium	141	142	166
Belize	..	..	113
Benin	57	91	98
Bhutan	110	72	50
Bolivia	58	106	56
Bosnia	83	118	58
Botswana	125	114	121
Brazil	89	34	123
Brunei	..	..	120
Bulgaria	100	102	131
Burkina Faso	71	92	36
Burundi	25	29	19
Cambodia	23	48	49
Cameroon	21	42	30
Canada	148	138	171
Cape Verde	119	124	84
Central African Rep.	10	10	10
Chad	5	12	4
Chile	137	110	157
China	34	21	66
Colombia	85	4	42
Comoros	43	143	62
Congo, Dem. Rep.	1	7	5
Congo, Rep.	15	83	31
Costa Rica	122	135	141
Côte d’Ivoire	8	22	9
Croatia	116	140	133
Cuba	62	64	81
Cyprus	134	117	114
Czech Rep.	128	141	153
Denmark	155	149	173
Djibouti	73	103	65
Dominican Rep.	52	47	79
Ecuador	35	76	71
Egypt	60	23	41
El Salvador	84	82	95
Equatorial Guinea	4	39	48
Eritrea	..	..	34
Estonia	136	136	142
Ethiopia	31	9	18
Fiji	64	94	77
Finland	152	144	178
France	139	133	160
Gabon	54	80	99
Gambia	61	63	82
Georgia	80	55	50

Table B4.2. Comparison of rankings obtained with PCA and FSI (full sample), 2006-2012

Country	SE index	PV index	FSI
Germany	144	148	159
Ghana	95	75	125
Greece	117	90	149
Grenada	..	..	118
Guatemala	67	79	69
Guinea	6	44	13
Guinea-Bissau	14	119	27
Guyana	91	100	103
Haiti	9	69	11
Honduras	53	59	87
Hungary	129	123	143
Iceland	..	..	170
India	97	1	96
Indonesia	44	37	55
Iran	12	18	44
Iraq	..	..	7
Ireland	142	137	175
Israel	126	8	61
Italy	120	121	152
Jamaica	96	61	122
Japan	138	145	165
Jordan	101	40	89
Kazakhstan	41	49	109
Kenya	29	25	22
Korea, Dem. Rep.	..	..	17
Korea, Rep.	127	101	156
Kosovo	..	..	85
Kuwait	107	93	128
Kyrgyz Rep.	47	51	39
Lao	17	74	47
Latvia	118	113	138
Lebanon	66	54	37
Lesotho	105	122	70
Liberia	36	99	28
Libya	..	..	110
Lithuania	124	132	147
Luxembourg	149	151	168
Macedonia	94	108	101
Madagascar	39	73	72
Malawi	93	86	32
Malaysia	103	60	119
Maldives	..	..	83
Mali	65	71	86
Malta	..	..	148
Mauritania	28	57	45
Mauritius	123	104	151
Mexico	87	14	100
Micronesia	..	..	106
Moldova	78	78	59
Mongolia	76	88	132
Montenegro	102	125	130
Morocco	63	50	90
Mozambique	33	70	75
Myanmar	3	3	14
Namibia	111	112	104
Nepal	40	24	25
Netherlands	153	153	167
New Zealand	154	152	174
Nicaragua	55	96	66
Niger	38	58	24
Nigeria	18	11	16

Table B4.2. Comparison of rankings obtained with PCA and FSI (full sample), 2006-2012

Country	SE index	PV index	FSI
Norway	150	154	179
Oman	113	115	145
Pakistan	37	2	12
Panama	106	131	136
Papua New Guinea	45	87	53
Paraguay	51	85	108
Peru	88	53	92
Philippines	72	5	54
Poland	..	..	146
Portugal	133	126	164
Qatar	115	109	139
Romania	90	81	129
Russian Federation	49	15	73
Rwanda	77	35	35
Samoa	..	..	111
São Tome and Principe	..	..	94
Saudi Arabia	74	28	92
Senegal	70	62	102
Serbia	98	120	78
Seychelles	..	..	116
Sierra Leone	27	98	29
Singapore	135	107	163
Slovak Rep.	121	127	144
Slovenia	132	150	158
Solomon Islands	92	155	40
Somalia	..	..	1
South Africa	109	43	126
South Sudan	..	..	6
Spain	131	89	154
Sri Lanka	75	6	26
Sudan	..	..	2
Suriname	99	116	105
Swaziland	69	67	64
Sweden	151	146	177
Switzerland	146	130	176
Syrian Arab Rep.	24	19	38
Tajikistan	16	41	43
Tanzania	46	84	74
Thailand	86	16	88
Timor-Leste	48	128	23
Togo	20	66	46
Trinidad & Tobago	114	97	124
Tunisia	81	38	117
Turkey	104	13	97
Turkmenistan	2	45	57
Uganda	42	20	20
Ukraine	59	68	112
United Arab Emirates	108	95	140
United Kingdom	143	129	162
United States	140	31	161
Uruguay	130	147	155
Uzbekistan	13	36	33
Venezuela	22	30	76
Vietnam	32	46	91
Yemen	11	17	15
Zambia	56	65	60
Zimbabwe	..	..	3

Notes: The rankings for the indices of state effectiveness and political violence consider 155 countries, whereas the ranking for the FSI considers 178 countries. Rankings were obtained after calculating the average of the scores for the period considered. Data for FSI from Fund for Peace and Foreign Policy (2015).

Table B4.3. Comparison of rankings obtained with PCA and SFI (full sample), 2003-2012

Country	SE index	PV index	SFI
	Rank	Rank	Rank
Afghanistan	..	..	4
Albania	78	108	119
Algeria	50	22	34
Angola	7	33	16
Argentina	83	105	130
Armenia	71	57	97
Australia	145	135	136
Austria	147	130	156
Azerbaijan	26	34	43
Bahrain	113	88	114
Bangladesh	17	26	48
Belarus	29	54	118
Belgium	141	144	139
Benin	58	100	59
Bhutan	108	71	73
Bolivia	61	101	56
Bosnia	80	118	105
Botswana	125	114	123
Brazil	90	36	108
Bulgaria	102	103	125
Burkina Faso	68	96	22
Burundi	23	30	12
Cambodia	21	45	49
Cameroon	20	39	21
Canada	148	141	156
Cape Verde	117	128	114
Central African Rep.	9	14	10
Chad	5	15	5
Chile	137	111	132
China	33	23	85
Colombia	84	4	59
Comoros	42	146	45
Congo, Dem. Rep.	1	7	2
Congo, Rep.	22	73	28
Costa Rica	121	139	141
Côte d'Ivoire	8	18	24
Croatia	115	136	125
Cuba	51	63	105
Cyprus	133	112	125
Czech Rep.	129	138	146
Denmark	155	151	156
Djibouti	65	99	37
Dominican Rep.	53	48	109
Ecuador	41	68	66
Egypt	62	27	52
El Salvador	86	79	99
Equatorial Guinea	4	40	55
Eritrea	..	..	36
Estonia	134	134	146
Ethiopia	28	10	7
Fiji	76	106	100
Finland	153	147	156
France	139	127	141
Gabon	59	80	69
Gambia	69	74	42
Georgia	74	44	90
Germany	144	145	156
Ghana	94	82	53
Greece	118	97	145

Table B4.3. Comparison of rankings obtained with PCA and SFI (full sample), 2003-2012

Country	SE index	PV index	SFI
	Rank	Rank	Rank
Guatemala	63	77	64
Guinea	10	55	13
Guinea-Bissau	16	117	18
Guyana	91	90	65
Haiti	6	38	35
Honduras	57	62	87
Hungary	130	122	156
India	99	1	51
Indonesia	36	24	75
Iran	14	21	43
Iraq	..	..	8
Ireland	142	140	156
Israel	127	6	89
Italy	122	123	149
Jamaica	96	60	125
Japan	138	143	154
Jordan	101	52	100
Kazakhstan	39	51	84
Kenya	30	28	49
Korea, Dem. Rep.	..	..	76
Korea, Rep.	126	102	153
Kosovo	..	..	97
Kuwait	107	85	124
Kyrgyz Rep.	40	61	63
Lao	11	59	40
Latvia	119	119	149
Lebanon	70	50	81
Lesotho	104	121	61
Liberia	37	98	11
Libya	..	..	80
Lithuania	123	137	139
Luxembourg	149	152	149
Macedonia	95	107	122
Madagascar	49	78	53
Malawi	89	81	33
Malaysia	106	56	109
Mali	67	92	27
Mauritania	31	66	26
Mauritius	124	109	138
Mexico	87	19	117
Moldova	77	76	77
Mongolia	79	89	92
Montenegro	103	125	119
Morocco	56	46	102
Mozambique	35	72	31
Myanmar	2	2	9
Namibia	112	110	102
Nepal	45	17	32
Netherlands	152	153	156
New Zealand	154	150	137
Nicaragua	60	94	74
Niger	38	70	17
Nigeria	19	11	14
Norway	151	154	135
Oman	109	116	116
Pakistan	34	3	28
Panama	105	132	105
Papua New Guinea	43	84	61
Paraguay	48	87	77

Table B4.3. Comparison of rankings obtained with PCA and SFI (full sample), 2003-2012

Country	SE index	PV index	SFI
	Rank	Rank	Rank
Peru	85	53	82
Philippines	72	5	56
Poland	..	..	155
Portugal	135	126	156
Qatar	116	115	113
Romania	88	86	112
Russian Federation	52	9	90
Rwanda	66	37	14
Saudi Arabia	73	29	77
Senegal	75	67	66
Serbia	97	120	104
Sierra Leone	25	93	6
Singapore	136	104	134
Slovak Rep.	120	133	141
Slovenia	131	149	156
Solomon Islands	92	155	72
Somalia	..	..	2
South Africa	111	49	85
South Sudan	..	..	20
Spain	132	83	148
Sri Lanka	82	8	47
Sudan	..	..	1
Suriname	98	113	94
Swaziland	64	75	88
Sweden	150	148	156
Switzerland	146	129	141
Syrian Arab Rep.	27	25	66
Taiwan	..	..	156
Tajikistan	18	47	46
Tanzania	44	69	56
Thailand	93	13	95
Timor-Leste	46	131	39
Togo	15	58	38
Trinidad & Tobago	114	95	121
Tunisia	81	41	96
Turkey	100	12	82
Turkmenistan	3	42	69
Uganda	47	16	23
Ukraine	55	65	109
United Arab Emirates	110	91	129
United Kingdom	143	124	149
United States	140	32	132
Uruguay	128	142	131
Uzbekistan	13	31	40
Venezuela	24	35	69
Vietnam	32	43	92
Yemen	12	20	25
Zambia	54	64	28
Zimbabwe	..	..	19

Notes: The rankings for the indices of state effectiveness and political violence consider 155 countries, whereas the ranking for the SFI considers 167 countries (though ranked from 1 to 156). Rankings were obtained after calculating the average of the scores for the period considered. Data for SFI from Marshall and Cole (2014b).

Table B4.4. Comparison of rankings obtained with PCA and CIFP (full sample), 2006-2012

Country	SE index	PV index	CIFP
	Rank	Rank	Rank
Afghanistan	..	..	3
Albania	79	111	126
Algeria	50	26	59
Andorra	..	..	196
Angola	7	32	28
Antigua & Bermuda	..	..	133
Argentina	82	105	148
Armenia	68	52	105
Aruba	..	..	150
Australia	145	139	181
Austria	147	134	189
Azerbaijan	26	33	83
Bahamas	..	..	149
Bahrain	112	77	103
Bangladesh	19	27	44
Barbados	..	..	160
Belarus	30	56	115
Belgium	141	142	172
Belize	..	..	118
Benin	57	91	48
Bhutan	110	72	72
Bolivia	58	106	85
Bosnia	83	118	84
Botswana	125	114	128
Brazil	89	34	138
Brunei	..	..	138
Bulgaria	100	102	147
Burkina Faso	71	92	38
Burundi	25	29	6
Cambodia	23	48	63
Cameroon	21	42	34
Canada	148	138	183
Cape Verde	119	124	110
Central African Rep.	10	10	9
Chad	5	12	7
Chile	137	110	159
China	34	21	90
Colombia	85	4	88
Comoros	43	143	43
Congo, Dem. Rep.	1	7	4
Congo, Rep.	15	83	27
Costa Rica	122	135	152
Côte d'Ivoire	8	22	10
Croatia	116	140	153
Cuba	62	64	130
Cyprus	134	117	157
Czech Rep.	128	141	171
Denmark	155	149	198
Djibouti	73	103	39
Dominica	..	..	146
Dominican Rep.	52	47	95
Ecuador	35	76	100
Egypt	60	23	71
El Salvador	84	82	116
Equatorial Guinea	4	39	35
Eritrea	..	..	12
Estonia	136	136	161
Ethiopia	31	9	8
Fiji	64	94	89

Table B4.4. Comparison of rankings obtained with PCA and CIFP (full sample), 2006-2012

Country	SE index	PV index	CIFP
	Rank	Rank	Rank
Finland	152	144	192
France	139	133	174
Gabon	54	80	78
Gambia	61	63	37
Georgia	80	55	98
Germany	144	148	184
Ghana	95	75	73
Greece	117	90	155
Grenada	..	..	145
Guatemala	67	79	64
Guinea	6	44	17
Guinea-Bissau	14	119	16
Guyana	91	100	74
Haiti	9	69	18
Honduras	53	59	69
Hong Kong	..	..	188
Hungary	129	123	162
Iceland	..	..	191
India	97	1	55
Indonesia	44	37	76
Iran	12	18	47
Iraq	..	..	19
Ireland	142	137	182
Israel	126	8	143
Italy	120	121	168
Jamaica	96	61	98
Japan	138	145	185
Jordan	101	40	81
Kazakhstan	41	49	109
Kenya	29	25	24
Kiribati	..	..	111
Korea, Dem. Rep.	..	..	58
Korea, Rep.	127	101	166
Kosovo	..	..	53
Kuwait	107	93	121
Kyrgyz Rep.	47	51	60
Lao	17	74	41
Latvia	118	113	156
Lebanon	66	54	68
Lesotho	105	122	70
Liberia	36	99	13
Libya	..	..	65
Liechtenstein	..	..	193
Lithuania	124	132	170
Luxembourg	149	151	178
Macao	..	..	179
Macedonia	94	108	119
Madagascar	39	73	36
Malawi	93	86	42
Malaysia	103	60	137
Maldives	..	..	93
Mali	65	71	31
Malta	..	..	168
Marshall Islands	..	..	107
Mauritania	28	57	15
Mauritius	123	104	151
Mexico	87	14	129
Micronesia	..	..	87
Moldova	78	78	117

Table B4.4. Comparison of rankings obtained with PCA and CIFP (full sample), 2006-2012

Country	SE index	PV index	CIFP
	Rank	Rank	Rank
Monaco	..	..	180
Mongolia	76	88	102
Montenegro	102	125	92
Morocco	63	50	97
Mozambique	33	70	40
Myanmar	3	3	30
Namibia	111	112	108
Nepal	40	24	32
Netherlands	153	153	186
New Caledonia	..	..	144
New Zealand	154	152	187
Nicaragua	55	96	67
Niger	38	58	22
Nigeria	18	11	19
Norway	150	154	195
Oman	113	115	113
Pakistan	37	2	14
Palau	..	..	135
Panama	106	131	131
Papua New Guinea	45	87	62
Paraguay	51	85	112
Peru	88	53	125
Philippines	72	5	76
Poland	..	..	165
Portugal	133	126	173
Puerto Rico	..	..	154
Qatar	115	109	134
Romania	90	81	142
Russian Federation	49	15	75
Rwanda	77	35	29
Samoa	..	..	124
São Tome and Principe	..	..	54
Saudi Arabia	74	28	96
Senegal	70	62	51
Serbia	98	120	104
Seychelles	..	..	141
Sierra Leone	27	98	23
Singapore	135	107	162
Slovak Rep.	121	127	164
Slovenia	132	150	176
Solomon Islands	92	155	61
Somalia	..	..	2
South Africa	109	43	114
South Sudan	..	..	1
Spain	131	89	175
Sri Lanka	75	6	79
St. Kitts & Nevis	..	..	140
St. Lucia	..	..	132
St. Vincent & the Grenadines	..	..	122
Sudan	..	..	5
Suriname	99	116	120
Swaziland	69	67	49
Sweden	151	146	197
Switzerland	146	130	194
Syrian Arab Rep.	24	19	50
Taiwan	..	..	190
Tajikistan	16	41	46
Tanzania	46	84	45
Thailand	86	16	106

Table B4.4. Comparison of rankings obtained with PCA and CIFP (full sample), 2006-2012

Country	SE index	PV index	CIFP
	Rank	Rank	Rank
Timor-Leste	48	128	52
Togo	20	66	33
Tonga	..	..	91
Trinidad & Tobago	114	97	127
Tunisia	81	38	123
Turkey	104	13	100
Turkmenistan	2	45	57
Uganda	42	20	26
Ukraine	59	68	94
United Arab Emirates	108	95	136
United Kingdom	143	129	177
United States	140	31	158
Uruguay	130	147	167
Uzbekistan	13	36	56
Vanuatu	..	..	86
Venezuela	22	30	82
Vietnam	32	46	80
West Bank and Gaza	..	..	21
Yemen	11	17	11
Zambia	56	65	65
Zimbabwe	..	..	25

Notes: The rankings for the indices of state effectiveness and political violence consider 155 countries, whereas the ranking for the SFI considers 198 countries. Rankings were obtained after calculating the average of the scores for the period considered. Data for CIFP from Carment, Langlois-Bertrand, and Samy (2015).

APPENDIX C. APPENDICES TO CHAPTER 4

Appendix C1. Data description

Table C1.1. Variables description

Variable	Data source	Notes
GDP per capita growth	Penn World Tables v9.0 (Feenstra et al., 2015)	Compound annual growth rate of the ratio between real GDP at constant 2011 national prices (in mil. 2011US$) and population (in millions) over the relevant period.
GDP per capita, log	Penn World Tables v9.0 (Feenstra et al., 2015)	Logarithm of the ratio between real GDP at constant 2011 national prices (in mil. 2011US$) and population (in millions) in the first year of the period for cross-country data and in the beginning of the relevant period for panel data.
Education	Barro and Lee (2013)	Percentage of the population aged 15 and over for whom the secondary level is the highest level of education completed, averaged across the relevant period.
Terms of trade	World Bank (2016)	Change in and variability (measured by the standard deviation) across the relevant period of the net barter terms of trade index (measured relative to the base year 2000).
Geography	Clemens et al. (2012)	Time-invariant measure developed by Bosworth and Collins (2003), which averages the number of frost days and tropical land area.
Inflation	World Bank (2016)	Logarithm of (1+inflation/100), with inflation measured by the consumer price index. Average in the first five years of the period in cross-country datasets, and across the relevant period in panel datasets.
Budget balance	World Bank (2016)	Average of the levels of cash surplus/deficit (% of GDP) in first five years of the period for cross-country data, and across the relevant period in panel data.
Trade policy	Wacziarg and Welch (2003); Clemens et al. (2012)	Sachs and Warner's (1995) index of openness, updated until 2001 by Wacziarg and Welch (2003), and then until 2005 by Clemens et al. (2012). Data for the first year available for the relevant period in the cross-country datasets, and average across the relevant period in panel data.
State ineffectiveness	Author's calculation	Index of state ineffectiveness, with higher levels representing more ineffective states. Averages across the relevant period.
Political violence	Author's calculation	Index of political violence, with higher levels representing more violent states. Averages across the relevant period.
Life expectancy	World Bank (2016)	Level of life expectancy at birth, total (years). Data for the first year available for the relevant period in the cross-country datasets, and average across the relevant period in panel data.
Financial depth	World Bank (2016)	Average of the levels of money and quasi money (M2) as % of GDP in first five years of the period for cross-country data, and across the relevant period in panel data.
Revolutions	Aisen and Veiga (2013)	Average number of revolutions per year in the relevant time horizon from Databanks International (2009). (Data available only until 2005.)
Ethnic fractionalization	Teorell et al. (2016)	Arithmetic average of Alesina et al.'s (2003) measure of ethnic fractionalization over the period. Reflects the probability that two randomly selected people from a given country will not share the same ethnicity (which involves a combination of racial and linguistic characteristics). The higher the number the lower the probability.
ICRG	Teorell et al. (2016)	Arithmetic average of the ICRG indicator of quality of government over the period. This indicator is the mean value of the ICRG variables "Corruption", "Law and Order" and "Bureaucracy Quality", scaled 0-1.
Settler mortality, log	Teorell et al. (2016)	Time-invariant variable representing the settler mortality rate faced by European settlers obtained by Acemoglu, Johnson and Robinson (2001).
Distance to equator	Hall and Jones (1999)	Time-invariant variable obtained by taking the absolute value of latitude in degrees and dividing it by 90 to obtain a 0-1 scale.
Population speaking an European language	Rodrik, Subramanian and Trebbi (2002)	Time-invariant variable that represents the fraction of a country's population speaking one of the five primary Western European languages (English, French, German, Portuguese, and Spanish) as a mother tongue in the present (considering 1999 as the present year).

Table C1.1. Variables description

Variable	Data source	Notes
Population speaking English	Rodrik, Subramanian and Trebbi (2002)	Time-invariant variable that captures the percentage of the population speaking English as a mother tongue in the present (considering 1999 as the present year).
Frankel and Romer's log of predicted trade share	Hall and Jones (1999)	Time-invariant variable constructed by Frankel and Romer (1996) based on a gravity model of international trade that considers only the population of a country and its geographical characteristics.
Domestic food price index	Food and Agriculture Organization (2016)	Level of the domestic food price index averaged across the relevant time period.

Notes: 'Relevant period' corresponds to the full period in the case of cross-country datasets, and to 5-year or 10-year averages in the case of panel datasets.

Table C1.2. Samples of countries

Cross-country data			Panel data	
1993-2012	1993-2002	2003-2012	1993-2012 5-year averages	1993-2012 10-year averages
Algeria	Algeria	Algeria	Algeria	Algeria
Argentina	Argentina	Australia	Argentina	Argentina
Australia	Australia	Austria	Australia	Australia
Austria	Austria	Bangladesh	Austria	Austria
Bangladesh	Bangladesh	Belgium	Bangladesh	Bangladesh
Belgium	Belgium	Benin	Belgium	Belgium
Benin	Benin	Botswana	Benin	Benin
Bolivia	Bolivia	Brazil	Bolivia	Bolivia
Botswana	Botswana	Bulgaria	Botswana	Botswana
Brazil	Brazil	Canada	Brazil	Brazil
Bulgaria	Bulgaria	Chile	Bulgaria	Bulgaria
Burundi	Burundi	Colombia	Burundi	Burundi
Cameroon	Cameroon	Congo, Dem. Rep.	Cameroon	Cameroon
Canada	Canada	Congo, Rep.	Canada	Canada
Chile	Chile	Costa Rica	Chile	Chile
China	China	Cyprus	China	China
Colombia	Colombia	Côte d'Ivoire	Colombia	Colombia
Congo, Dem. Rep.	Congo, Rep.	Denmark	Congo, Rep.	Congo, Dem. Rep.
Congo, Rep.	Costa Rica	Dominican Rep.	Costa Rica	Congo, Rep.
Costa Rica	Côte d'Ivoire	Egypt	Côte d'Ivoire	Costa Rica
Côte d'Ivoire	Cyprus	El Salvador	Cyprus	Côte d'Ivoire
Cyprus	Denmark	Finland	Denmark	Cyprus
Denmark	Dominican Rep.	France	Dominican Rep.	Denmark
Dominican Rep.	Ecuador	Germany	Ecuador	Dominican Rep.
Ecuador	Egypt	Ghana	Egypt	Ecuador
Egypt	El Salvador	Greece	El Salvador	Egypt
El Salvador	Finland	Guatemala	Finland	El Salvador
Finland	France	Honduras	France	Finland
France	Germany	Hungary	Germany	France
Germany	Ghana	India	Ghana	Germany
Ghana	Greece	Indonesia	Greece	Ghana
Greece	Guatemala	Iran	Guatemala	Greece
Guatemala	Haiti	Ireland	Haiti	Guatemala
Haiti	Hungary	Israel	Honduras	Haiti
Honduras	India	Italy	Hungary	Honduras
Hungary	Indonesia	Jamaica	India	Hungary
India	Iran	Japan	Indonesia	India
Indonesia	Ireland	Jordan	Iran	Indonesia
Iran	Israel	Kenya	Ireland	Iran
Ireland	Italy	Korea, Rep.	Israel	Ireland
Israel	Jamaica	Lesotho	Italy	Israel
Italy	Japan	Malaysia	Jamaica	Italy
Jamaica	Jordan	Mali	Jordan	Jamaica
Japan	Kenya	Mauritius	Kenya	Japan
Jordan	Korea, Rep.	Morocco	Korea, Rep.	Jordan
Kenya	Lesotho	Mozambique	Lesotho	Kenya
Korea, Rep.	Malaysia	Myanmar	Malaysia	Korea, Rep.
Lesotho	Mali	Nepal	Mali	Lesotho
Malaysia	Mauritius	Netherlands	Mauritius	Malaysia
Mali	Mexico	New Zealand	Mexico	Mali
Mauritius	Morocco	Nicaragua	Morocco	Mauritius
Mexico	Myanmar	Norway	Myanmar	Mexico
Morocco	Nepal	Pakistan	Nepal	Morocco
Mozambique	Netherlands	Paraguay	Netherlands	Mozambique
Myanmar	New Zealand	Peru	New Zealand	Myanmar
Nepal	Nicaragua	Philippines	Nicaragua	Nepal
Netherlands	Norway	Portugal	Norway	Netherlands
New Zealand	Pakistan	Romania	Pakistan	New Zealand
Nicaragua	Panama	Russian Federation	Panama	Nicaragua
Norway	Paraguay	Rwanda	Paraguay	Norway
Pakistan	Peru	Senegal	Peru	Pakistan
Panama	Philippines	Singapore	Philippines	Panama
Paraguay	Portugal	South Africa	Portugal	Paraguay
Peru	Romania	Spain	Romania	Peru
Philippines	Russian Federation	Sri Lanka	Russian Federation	Philippines
Portugal	Rwanda	Sweden	Senegal	Portugal
Romania	Senegal	Switzerland	Singapore	Romania
Russian Federation	Sierra Leone	Syrian Arab Rep.	South Africa	Russian Federation
Rwanda	Singapore	Tanzania	Sri Lanka	Rwanda
Senegal	South Africa	Thailand	Swaziland	Senegal
Sierra Leone	Spain	Togo	Sweden	Sierra Leone
Singapore	Sri Lanka	Trinidad & Tobago	Switzerland	Singapore
South Africa	Swaziland	Tunisia	Syrian Arab Rep.	South Africa
Spain	Sweden	Turkey	Thailand	Spain
Sri Lanka	Switzerland	Uganda	Togo	Sri Lanka
Swaziland	Syrian Arab Rep.	United Kingdom	Trinidad & Tobago	Swaziland
Sweden	Thailand	United States	Tunisia	Sweden
Switzerland	Trinidad & Tobago	Uruguay	Turkey	Switzerland

Syrian Arab Rep.	Tunisia	Venezuela		Uganda	Syrian Arab Rep.
Tanzania	Turkey	Zambia		United Kingdom	Tanzania
Thailand	Uganda			United States	Thailand
Togo	United Kingdom			Uruguay	Togo
Trinidad & Tobago	United States			Venezuela	Trinidad & Tobago
Tunisia	Uruguay			Yemen	Tunisia
Turkey	Venezuela			Zambia	Turkey
Uganda	Yemen				Uganda
United Kingdom	Zambia				United Kingdom
United States					United States
Uruguay					Uruguay
Venezuela					Venezuela
Yemen					Yemen
Zambia					Zambia

Table C1.3. Descriptive statistics, cross-country data

	Obs	Mean	Std. Dev	Min	Max	Obs	Mean	Std. Dev	Min	Max	Obs	Mean	Std. Dev	Min	Max
	1993-2012					1993-2002					2003-2012				
Real GDP per capita growth	92	2.136641	1.576926	-2.011328	8.653811	87	1.882072	1.845489	-3.612879	7.208185	80	2.417622	1.887718	-1.072815	10.11893
Log(initial pc GDP)	92	8.827087	1.173076	5.831714	10.9823	87	8.92795	1.111673	6.469967	10.9823	80	8.915889	1.187617	5.831714	10.9823
Education	92	21.76891	11.98971	1.201902	50.53092	87	20.15492	11.9177	1.311274	53.82947	80	25.1612	12.97448	1.647901	52.95671
Change in terms of trade	92	3.73645	24.72288	-42.45064	103.2097	87	-.967539	2.791307	-9.782608	5.849472	80	-5.425709	33.85301	-130.7658	115.33
St. dev. of terms of trade	92	16.7738	15.06852	.9890673	75.80861	87	7.227754	8.076818	.0896293	40.78114	80	12.25825	12.95037	.9912537	56.95029
Geography	92	-.0422727	.9944857	-1.04	1.783878	87	.0092951	.9977092	-1.04	1.783878	80	.0206035	1.010335	-1.04	1.783878
Log(1+inflation)	92	.2156044	.5059478	.0074228	4.007075	87	.1716055	.3184602	.0074228	2.217585	80	.0559338	.0438649	.00037	.191469
Initial budget balance	92	-2.124591	3.350551	-8.871235	13.66614	87	-2.15153	3.430725	-8.871235	13.66614	80	-1.104589	3.795847	-8.528645	13.15924
Initial trade policy	92	.75	.4353854	0	1	87	.7816092	.4155492	0	1	80	.8625	.3465472	0	1
Sub-Saharan Africa	92	.2391304	.4288898	0	1	87	.2068966	.407429	0	1	80	.225	.4202169	0	1
East Asia	92	.1195652	.3262303	0	1	87	.1264368	.3342676	0	1	80	.125	.3328055	0	1
Latin America and Caribbean	92	.2282609	.4220114	0	1	87	.2298851	.4231979	0	1	80	.1875	.3927749	0	1
State ineffectiveness	92	-.4387873	2.643555	-5.382778	4.168341	87	-.6817894	2.524259	-5.094729	3.856543	80	-.7292272	2.706384	-5.5108	4.306918
Political violence	92	.000762	1.850667	-2.053569	7.550156	87	-.0178419	1.978693	-2.096025	7.658358	80	-.0328353	1.894972	-2.03281	7.429932

Table C1.4. Descriptive statistics, panel data

	Obs	Mean	Std. Dev	Min	Max	Obs	Mean	Std. Dev	Min	Max
	5-year periods					10-year periods				
Real GDP per capita growth	198	2.612477	2.235379	-4.319879	12.29542	167	2.138623	1.879454	-3.612879	10.11893
Log(initial pc GDP)	198	8.945407	1.071635	6.238213	11.22593	167	8.941128	1.147029	6.157898	11.15617
Education	198	21.69387	12.33916	1.508707	57.03806	167	22.55314	12.64861	1.311274	53.82947
Terms of trade	198	-.9735745	12.18255	-88.2172	71.92255	167	-3.10319	23.54622	-130.7658	115.33
Geography	198	-.0684408	.9732804	-1.04	1.783878	167	.0147123	1.000762	-1.04	1.783878
Log(1+inflation)	198	.0876239	.1745852	-.0110155	2.217585	167	.0951365	.1729159	-.0008251	1.633731
Budget balance	198	-1.252692	3.46125	-10.95463	13.66614	167	-1.874662	3.393525	-9.621738	14.80713
Trade policy	198	.8558923	.33265	0	1	167	.8518962	.3390988	0	1
Sub-Saharan Africa	198	.1919192	.3948081	0	1	167	.2155689	.4124531	0	1
East Asia	198	.1363636	.3440442	0	1	167	.1257485	.3325629	0	1
Latin America and Caribbean	198	.2575758	.4384076	0	1	167	.2095808	.4082336	0	1
State ineffectiveness	198	-.5386637	2.425426	-5.440109	4.314941	167	-.7045141	2.605269	-5.5108	4.306918
Political violence	198	.0869463	2.000104	-2.096025	7.70021	167	-.0250243	1.933225	-2.096025	7.658358

Appendix C2. Diagnostic tests

Table C2.1. Correlation matrix, cross-country data, 1993-2012

	GDP per capita	Education	Terms of trade	Std. dev. Terms of trade	Geography	Inflation	Budget balance	Trade policy	SSA	East Asia	Latin America	State ineffectiveness	Political violence
GDP per capita	1												
Education	**0.7481**	1											
Terms of trade	0.1334	0.1310	1										
St. dev. terms of trade	-0.3035	-0.2898	0.3129	1									
Geography	0.6183	0.5970	0.1411	-0.3325	1								
Inflation	-0.1704	-0.1014	0.0859	0.1390	-0.0648	1							
Budget balance	-0.0362	-0.0103	0.1053	0.0601	-0.2595	-0.1412	1						
Trade policy	0.4701	0.4144	-0.0786	-0.4902	0.2441	-0.1912	0.0598	1					
Sub-Saharan Africa	-0.6009	-0.5102	-0.1092	0.2394	-0.3986	0.1289	0.0495	-0.2648	1				
East Asia	0.0855	0.1501	0.0130	0.0017	-0.0149	-0.1109	0.3182	0.0580	-0.2066	1			
Latin America	-0.0026	-0.0524	0.0181	0.0889	-0.3603	0.0467	0.1842	0.1346	-0.3049	-0.2004	1		
State ineffectiveness	**-0.8349**	-0.7085	-0.0291	0.4664	-0.6466	0.2775	0.0154	-0.5526	0.3934	-0.0914	0.1826	1	
Political violence	-0.5107	-0.3909	0.0052	0.3399	-0.3312	0.3027	-0.1426	-0.4983	0.0905	0.0780	-0.1176	0.5957	1

Notes: Coefficients higher than 0.7 highlighted in bold. Correlations are calculated for the 92 countries for which all necessary data were available.

Table C2.2. Correlation matrix, cross-country data, 1993-2002

	GDP per capita	Education	Terms of trade	Std. dev. Terms of trade	Geography	Inflation	Budget balance	Trade policy	SSA	East Asia	Latin America	State ineffectiveness	Political violence
GDP per capita	1												
Education	0.6832	1											
Terms of trade	0.2013	0.1719	1										
St. dev. terms of trade	-0.5766	-0.4684	-0.1678	1									
Geography	0.6061	0.5593	0.0811	-0.4819	1								
Inflation	-0.0487	-0.0670	-0.1300	0.0624	0.0346	1							
Budget balance	0.0051	0.0413	-0.0387	0.1098	-0.2280	-0.1818	1						
Trade policy	0.3956	0.3278	0.3105	-0.3884	0.1986	-0.0718	0.0862	1					
Sub-Saharan Africa	-0.5462	-0.4357	0.0556	0.3713	-0.3685	-0.0461	0.0104	-0.1421	1				
East Asia	0.0584	0.1824	0.0215	0.1585	-0.0352	-0.1291	0.3701	0.0337	-0.1943	1			
Latin America	-0.0348	-0.1265	-0.0896	-0.0027	-0.3806	0.1563	0.1862	0.0904	-0.2791	-0.2079	1		
State ineffectiveness	**-0.8478**	-0.6662	-0.3073	0.5241	-0.6130	0.2318	-0.0186	-0.5265	0.3652	-0.0664	0.1854	1	
Political violence	-0.5572	-0.3926	-0.2117	0.4714	-0.3614	0.1424	-0.1721	-0.5384	0.1223	0.0707	-0.0987	0.6139	1

Notes: Coefficients higher than 0.7 highlighted in bold. Correlations are calculated for the 87 countries for which all necessary data were available.

Table C2.3. Correlation matrix, cross-country data, 2003-2012

	GDP per capita	Education	Terms trade	Std. dev. Terms of trade	Geography	Inflation	Budget balance	Trade policy	SSA	East Asia	Latin America	State ineffectiveness	Political violence
GDP per capita	1												
Education	**0.7370**	1											
Terms of trade	0.1742	0.2419	1										
St. dev. terms of trade	-0.1993	-0.2007	-0.2923	1									
Geography	0.6285	0.5798	0.2754	-0.2742	1								
Inflation	-0.4379	-0.2953	-0.1608	0.2318	-0.3666	1							
Budget balance	0.0237	-0.0625	0.1111	0.4141	0.0388	-0.0386	1						
Trade policy	0.2577	0.2524	0.3200	-0.4838	0.1488	-0.3736	-0.1078	1					
Sub-Saharan Africa	-0.6105	-0.4736	-0.2043	0.2675	-0.4117	0.1378	0.1140	-0.1326	1				
East Asia	0.0976	0.0736	0.0968	-0.0706	-0.0916	-0.0846	0.0493	0.0412	-0.2037	1			
Latin America	-0.0326	-0.0338	-0.0776	0.1065	-0.3694	0.3005	0.0340	0.0988	-0.2588	-0.1816	1		
State ineffectiveness	**-0.8292**	-0.6753	-0.2343	0.3727	-0.6547	0.5698	0.0470	-0.4412	0.3942	-0.0821	0.1689	1	
Political violence	-0.4734	-0.3479	-0.0792	0.1519	-0.3166	0.3721	-0.1209	-0.4584	0.0145	0.0733	-0.0904	0.5969	1

Notes: Coefficients higher than 0.7 highlighted in bold. Correlations are calculated for the 80 countries for which all necessary data were available.

Table C2.4. Correlation matrix, panel data, 5-year periods

	GDP per capita	Education	Terms of trade	Geography	Inflation	Budget balance	Trade policy	SSA	East Asia	Latin America	State ineffectiveness	Political violence
GDP per capita	1											
Education	0.6635	1										
Terms of trade	0.0224	0.1253	1									
Geography	0.5469	0.5400	0.1340	1								
Inflation	-0.0883	-0.1753	-0.0281	-0.0957	1							
Budget balance	0.1318	0.0341	0.0567	0.0433	-0.1433	1						
Trade policy	0.2945	0.2224	0.1417	0.0720	-0.0641	0.0098	1					
Sub-Saharan Africa	-0.4938	-0.3702	-0.0334	-0.2806	-0.0216	0.1144	0.0029	1				
East Asia	0.0356	0.0950	0.0670	-0.1072	-0.0519	0.1758	-0.0492	-0.1936	1			
Latin America	-0.0255	-0.1333	-0.0536	-0.3689	0.1989	-0.0080	0.1096	-0.2871	-0.2341	1		
State ineffectiveness	**-0.8381**	-0.6547	-0.1534	-0.5844	0.1854	-0.1149	-0.4280	0.2903	-0.0282	0.1754	1	
Political violence	-0.4833	-0.3173	-0.0247	-0.2864	0.1372	-0.2559	-0.4885	-0.0099	0.1379	-0.1476	0.5372	1

Notes: Coefficients higher than 0.7 highlighted in bold. Correlations are calculated for the 85 countries for which all necessary data were available.

Table C2.5. Correlation matrix, panel data, 10-year periods

	GDP per capita	Education	Terms of trade	Geography	Inflation	Budget balance	Trade policy	SSA	East Asia	Latin America	State ineffectiveness	Political violence
GDP per capita	1											
Education	**0.7099**	1										
Terms of trade	0.1399	0.1609	1									
Geography	0.6158	0.5591	0.1947	1								
Inflation	-0.0846	-0.1280	-0.0326	-0.0283	1							
Budget balance	0.0166	0.0011	-0.0089	-0.0586	-0.0873	1						
Trade policy	0.3340	0.2713	0.1836	0.1417	-0.1241	-0.0478	1					
Sub-Saharan Africa	-0.5836	-0.4413	-0.1411	-0.3894	-0.0188	0.1134	-0.1365	1				
East Asia	0.0745	0.1250	0.0678	-0.0623	-0.0955	0.1660	0.0059	-0.1988	1			
Latin America	-0.0297	-0.0902	-0.0518	-0.3748	0.1578	0.0763	0.1124	-0.2699	-0.1953	1		
State ineffectiveness	**-0.8366**	-0.6594	-0.1839	-0.6336	0.2353	0.0287	-0.4720	0.3794	-0.0741	0.1773	1	
Political violence	-0.5149	-0.3634	-0.0660	-0.3401	0.1586	-0.1577	-0.5282	0.0709	0.0719	-0.0947	0.6047	1

Notes: Coefficients higher than 0.7 highlighted in bold. Correlations are calculated for the 92 countries for which all necessary data were available.

Table C2.6. Variance inflation factors, cross-country data

1993-2012		1993-2002		2003-2012	
Variable	VIF	Variable	VIF	Variable	VIF
State ineffectiveness	5.95	State ineffectiveness	6.31	GDP per capita	6.25
GDP per capita	5.76	GDP per capita	5.64	State ineffectiveness	6.14
SSA	3.31	Geography	2.87	SSA	3.49
Geography	3.03	SSA	2.56	Geography	3.47
Education	2.67	LAC	2.38	LAC	2.61
LAC	2.60	Political violence	2.35	Education	2.53
Political violence	2.36	Education	2.24	Political violence	2.36
Trade policy	1.87	Terms of trade std.	1.90	Trade policy	1.97
Terms trade std.	1.85	Trade policy	1.80	Terms trade std.	1.96
East Asia	1.56	East Asia	1.71	Inflation	1.75
Budget balance	1.41	Budget balance	1.48	Budget balance	1.48
Terms of trade	1.27	Inflation	1.30	East Asia	1.46
Inflation	1.27	Terms trade	1.21	Terms trade	1.34
Mean VIF	2.69	Mean VIF	2.60	Mean VIF	2.83

Table C2.7. Variance inflation factors, panel data

5-year periods		10-year periods	
Variable	VIF	Variable	VIF
GDP per capita	5.28	GDP per capita	5.71
State ineffectiveness	5.21	State ineffectiveness	5.59
SSA	2.53	Geography	3.06
Geography	2.50	SSA	2.90
LAC	2.34	Political violence	2.37
Political violence	2.16	LAC	2.35
Education	2.12	Education	2.22
Trade policy	1.56	Trade policy	1.66
East Asia	1.52	East Asia	1.45
Budget balance	1.26	Budget balance	1.20
Inflation	1.14	Inflation	1.19
Terms of trade	1.12	Terms trade	1.09
Mean VIF	2.40	Mean VIF	2.57

Appendix C3. State fragility indices: additional tables

Table C3.1. Eigenvectors of the first principal component for state ineffectiveness and political violence

State ineffectiveness		Political violence	
Variable	Eigenvectors	Variable	Eigenvectors
Rule of law	0.3932	Physical integrity	-0.4193
Regulatory quality	0.3793	Empowerment rights	-0.2607
Independence of judiciary	0.3161	Political terror scale	0.4289
Control of corruption	0.3848	Episodes of civil violence	0.4316
Property rights protection	0.3655	Armed conflict	0.3891
Government effectiveness	0.3909	Coups d'état	0.0909
Public health expenditure	0.2987	Revolutionary wars	0.2882
Access to water	0.2737	Ethnic wars	0.3784
Failure of state authority	-0.0542		

Notes: The eigenvectors in the first column were obtained from applying PCA to the variables used to proxy for state ineffectiveness, whereas those in the second column were obtained from applying PCA to the variables proxying for political violence.

Table C3.2. Eigenvectors of the first principal component for the two versions of the single index of state fragility

State fragility (version 1)		State fragility (version 2)	
Variable	Eigenvectors	Variable	Eigenvectors
State ineffectiveness	-0.7071	Rule of law	0.3326
Political violence	0.7071	Regulatory quality	0.3234
		Independence of judiciary	0.2751
		Control of corruption	0.3271
		Property rights protection	0.3053
		Government effectiveness	0.3262
		Public health expenditure	0.2675
		Access to water	0.2228
		Failure of state authority	-0.0489
		Physical integrity	0.2783
		Empowerment rights	0.2379
		Political terror scale	-0.2846
		Episodes of civil violence	-0.1474
		Armed conflict	-0.1311
		Coups d'état	-0.0507
		Revolutionary wars	-0.0859
		Ethnic wars	-0.1225

Notes: The eigenvectors for version 1 were obtained from applying PCA to the two indices obtained before, whereas those in version 2 result from applying PCA to all the variables used in the analysis.

Table C3.3. Standard deviation decomposition, panel data, 1993-2012

	State ineffectiveness			Political violence		
	Mean	Std. dev.	Obs.	Mean	Std. dev.	Obs.
Overall		2.470355	N=1878		1.835623	N=3106
Between	-1.51e-09	2.462491	n= 158	-.0875184	1.67571	n= 166
Within		0.3274105	T=11.8861		0.794168	T=18.7108

Figure C3.1. Histograms for state ineffectiveness and political violence, cross-country data, 1993-2012

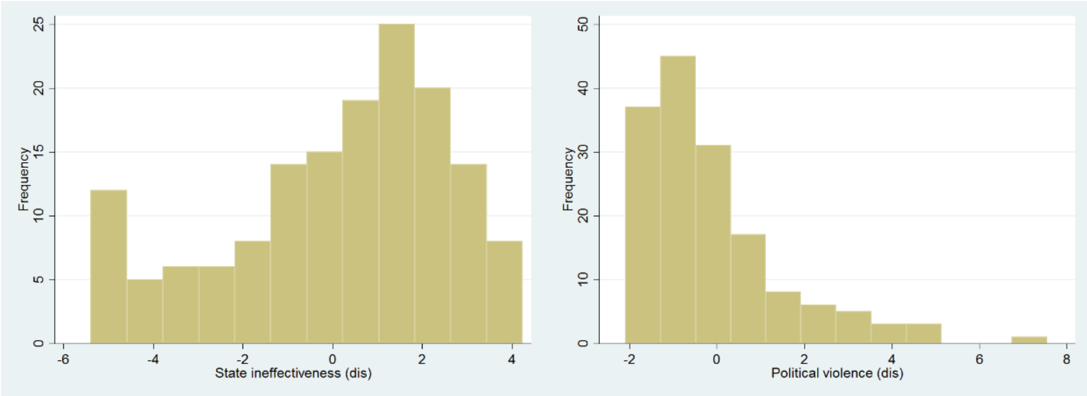


Figure C3.2. Histograms for state ineffectiveness and political violence, cross-country data, 1993-2002

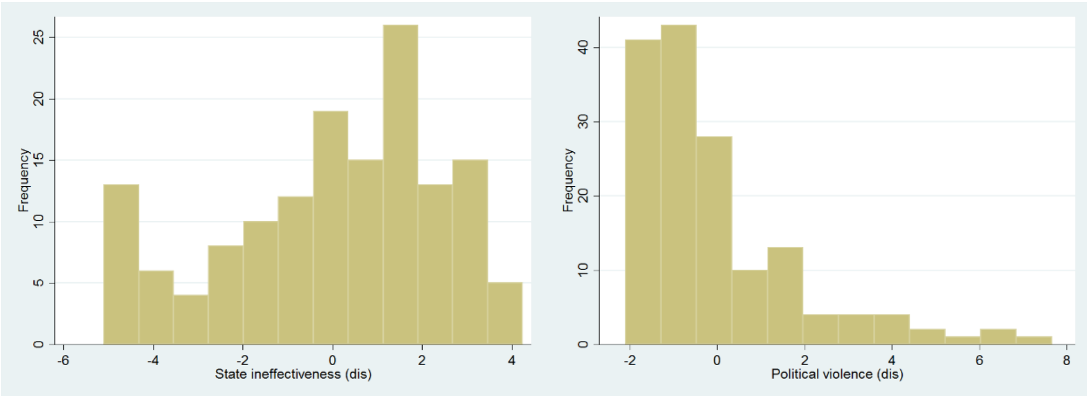


Figure C3.3. Histograms for state ineffectiveness and political violence, cross-country data, 2003-2012

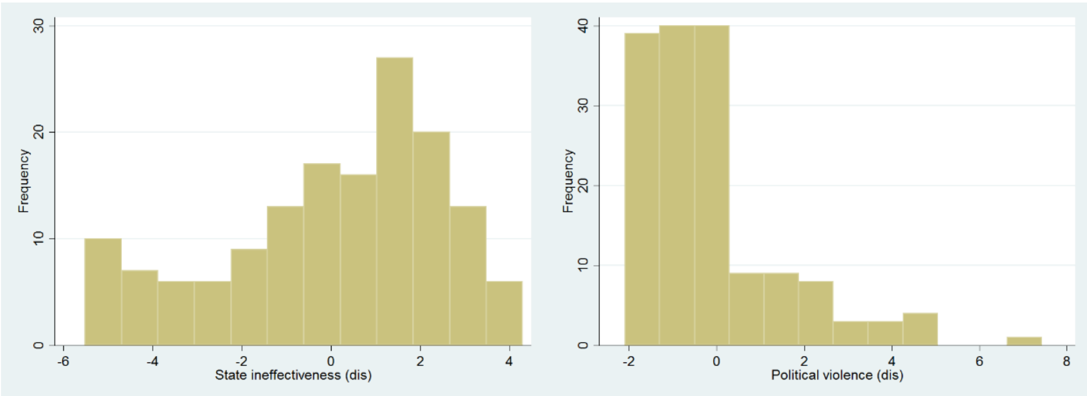


Figure C3.4. Histograms for state ineffectiveness and political violence, panel data, 5-year averages

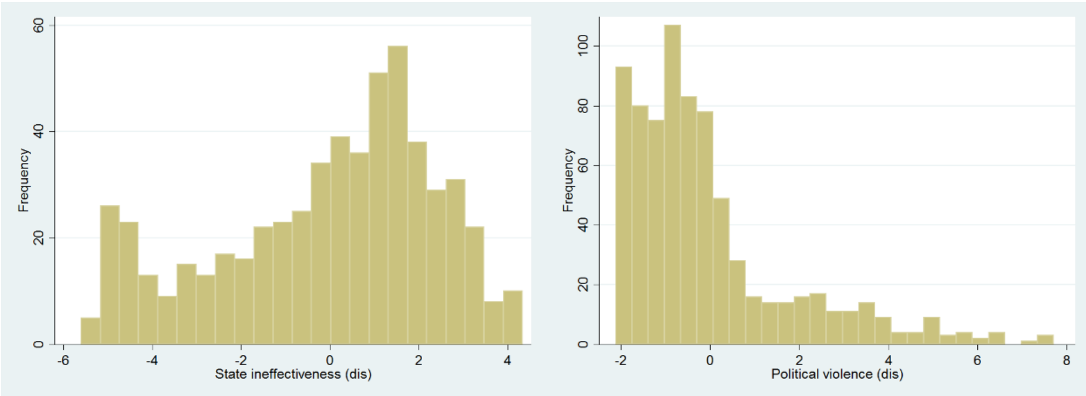
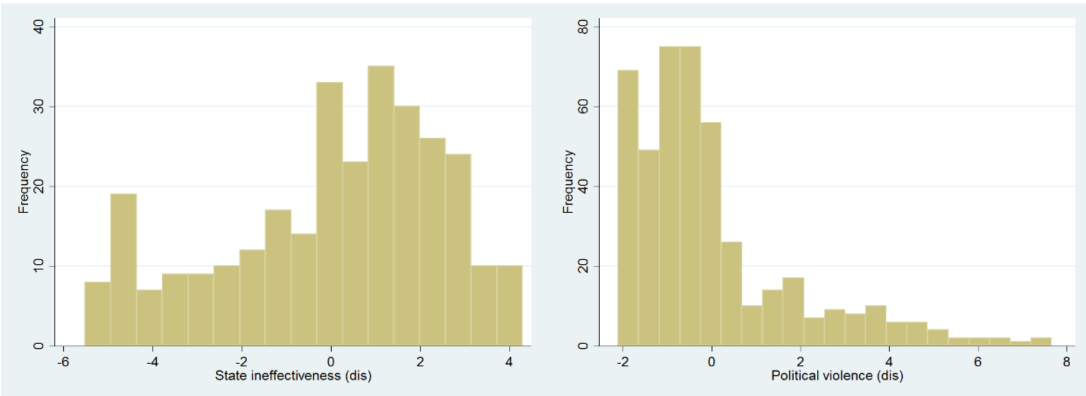


Figure C3.5. Histograms for state ineffectiveness and political violence, panel data, 10-year averages



Appendix C4. Additional results

Table C4.1. Results obtained with the different dimensions of state fragility

	Dependent variable: real GDP per capita growth				
	Cross-country			Panel	
	20-year 1993-2012	10-year 1993-2002	2003-2012	5-year averages	10-year averages
	(1)	(2)	(3)	(4)	(5)
Log(initial pc GDP)	-1.402***	-0.913***	-1.183***	-0.984***	-0.991***
	(0.298)	(0.341)	(0.392)	(0.307)	(0.336)
Education	0.0165	0.0121	0.0485**	0.0217	0.0117
	(0.0198)	(0.0169)	(0.0182)	(0.0182)	(0.0174)
Terms of trade	-0.00137	-0.102	0.00581	-0.00258	-0.105
	(0.00590)	(0.0682)	(0.00746)	(0.0186)	(0.0686)
St. dev. terms of trade	0.00950	0.0474	0.00969		
	(0.00958)	(0.0319)	(0.0153)		
Geography	0.344	0.422	-0.206	0.587***	0.369
	(0.241)	(0.288)	(0.292)	(0.208)	(0.264)
Log(1+inflation)	0.164	-0.719	17.79***	0.277	-0.555
	(0.337)	(0.523)	(4.798)	(0.644)	(0.621)
Initial budget balance	0.0313	-0.0454	0.0597	0.0681	-0.0318
	(0.0556)	(0.0552)	(0.0434)	(0.0454)	(0.0598)
Initial trade policy	0.0180	0.604	0.581	0.0918	0.574
	(0.534)	(0.561)	(0.714)	(0.586)	(0.734)
Sub-Saharan Africa	-0.197	-0.937	-0.461	-0.829	-0.843
	(0.639)	(0.756)	(0.734)	(0.593)	(0.660)
East Asia	1.187*	0.427	0.846	0.908	0.527
	(0.678)	(0.711)	(0.549)	(0.681)	(0.740)
Latin America & Caribbean	1.341**	0.0636	0.265	0.354	0.0410
	(0.631)	(0.880)	(0.728)	(0.603)	(0.805)
Rule of law	0.719	0.795	-0.117	0.369	0.618
	(1.010)	(0.983)	(1.027)	(0.784)	(1.006)
Regulatory quality	0.424	0.786	0.206	0.907	0.494
	(0.698)	(0.777)	(0.868)	(0.793)	(0.969)
Independence of judiciary	0.515	-0.261	0.390	0.222	-0.296
	(0.563)	(0.496)	(0.508)	(0.388)	(0.491)
Control of corruption	-0.371	0.114	1.142	-0.0836	0.334
	(0.652)	(0.765)	(0.854)	(0.685)	(0.826)
Property rights enforcement	-0.0284	-0.0172	-0.0145	-0.0242	-0.00751
	(0.0268)	(0.0235)	(0.0295)	(0.0187)	(0.0222)
Government effectiveness	0.723	-0.00462	-0.442	-0.166	-0.0409
	(1.108)	(0.711)	(1.150)	(0.744)	(0.729)
Public expenditure in health	-0.110	-0.436***	-0.132	-0.363**	-0.386**
	(0.108)	(0.157)	(0.128)	(0.154)	(0.158)
Access to water	0.0180	0.00490	0.00401	0.0223	-0.000824
	(0.0190)	(0.0203)	(0.0263)	(0.0201)	(0.0179)
Failure state authority	-2.184	-1.287*	-0.805**	-0.584	-1.700**
	(1.360)	(0.753)	(0.360)	(0.667)	(0.814)
Physical integrity rights	0.0363	0.322	-0.255	0.366*	0.338
	(0.273)	(0.229)	(0.283)	(0.187)	(0.239)
Empowerment rights	-0.174	-0.0728	-0.131	-0.149*	-0.0634
	(0.109)	(0.102)	(0.0877)	(0.0830)	(0.0965)
Political terror scale	-0.225	0.0142	-0.656	0.133	0.0766
	(0.554)	(0.516)	(0.662)	(0.417)	(0.474)
Episodes of civil violence	0.0689	0.273	-0.195	0.403	0.246
	(0.413)	(0.408)	(0.302)	(0.274)	(0.388)
Armed conflict	0.516	0.200	0.751	0.609	0.253
	(0.586)	(0.495)	(0.473)	(0.438)	(0.487)
Coups d'état	0.678	-3.409*	-4.332	-5.388***	-3.106
	(5.275)	(1.783)	(3.667)	(1.758)	(1.870)
Revolutionary wars	-0.115	0.0299	0.354	-0.434	0.0561
	(0.487)	(0.426)	(0.511)	(0.356)	(0.427)
Ethnic wars	-0.0172	-0.322	0.291	-0.592	-0.209
	(0.396)	(0.423)	(0.433)	(0.421)	(0.410)
Constant	15.14***	10.15***	14.72***	10.69***	10.66***
	(3.212)	(3.510)	(3.433)	(3.385)	(3.775)
Observations	92	88	80	203	88
R-squared	0.624	0.720	0.736	0.486	0.706
r2_a	0.457	0.587	0.591	0.400	0.574

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table C4.2. LIML results, cross-country and panel data

	Dependent variable: real GDP per capita growth									
	Cross-country						Panel			
	1993-2012		1993-2002		2003-2012		5-year averages		10-year averages	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Initial pc GDP, log	-1.599***	-1.627***	-1.667***	-1.635***	-0.992**	-1.333***	-1.842***	-1.726***	-1.863***	-1.936***
	(0.403)	(0.384)	(0.518)	(0.487)	(0.463)	(0.322)	(0.604)	(0.563)	(0.492)	(0.450)
Education	0.0286	0.0280	0.0124	0.0128	0.0554***	0.0525***	0.0348*	0.0363*	0.0380***	0.0373***
	(0.0178)	(0.0179)	(0.0167)	(0.0164)	(0.0161)	(0.0160)	(0.0193)	(0.0190)	(0.0143)	(0.0144)
Terms of trade growth	0.00365	0.00362	-0.137**	-0.136**	0.000588	-0.000469	-0.0169	-0.0151	-0.00918	-0.00941
	(0.00528)	(0.00535)	(0.0683)	(0.0674)	(0.00706)	(0.00624)	(0.0175)	(0.0177)	(0.00784)	(0.00777)
St. dev. TOT growth	0.00699	0.00748	0.0316	0.0321	0.00452	0.00941				
	(0.0101)	(0.00995)	(0.0373)	(0.0373)	(0.0148)	(0.0135)				
Geography	0.158	0.151	-0.106	-0.0995	-0.0966	-0.230	-0.0442	-0.0211	-0.271	-0.293
	(0.275)	(0.271)	(0.300)	(0.294)	(0.292)	(0.241)	(0.281)	(0.268)	(0.259)	(0.252)
Inflation[a]	-0.529	-0.520	0.246	0.220	16.02***	17.93***	1.375*	1.302*	0.848	0.946
	(0.443)	(0.444)	(0.424)	(0.411)	(5.394)	(4.525)	(0.766)	(0.721)	(0.741)	(0.712)
Budget balance[a]	0.0651	0.0648	0.0570	0.0571	0.0824**	0.0911***	0.117***	0.116***	0.124***	0.126***
	(0.0402)	(0.0402)	(0.0478)	(0.0473)	(0.0344)	(0.0318)	(0.0451)	(0.0443)	(0.0357)	(0.0359)
Policy[a]	0.187	0.174	0.659	0.684	0.581	0.465	-0.480	-0.412	0.0421	-0.0129
	(0.486)	(0.480)	(0.540)	(0.523)	(0.664)	(0.563)	(0.847)	(0.817)	(0.708)	(0.683)
Sub-Saharan Africa	-1.399***	-1.415***	-2.554***	-2.550***	-0.905	-1.156**	-2.195***	-2.153***	-2.334***	-2.370***
	(0.483)	(0.479)	(0.684)	(0.680)	(0.596)	(0.516)	(0.572)	(0.548)	(0.603)	(0.600)
East Asia	1.112*	1.110	0.491	0.485	1.241***	1.130***	0.974	0.975	0.661	0.646
	(0.675)	(0.677)	(0.733)	(0.733)	(0.383)	(0.365)	(0.662)	(0.654)	(0.538)	(0.540)
Latin America	0.337	0.352	-1.005*	-1.019*	-0.217	-0.230	-0.341	-0.379	-0.513	-0.494
	(0.438)	(0.435)	(0.553)	(0.543)	(0.577)	(0.519)	(0.462)	(0.439)	(0.397)	(0.390)
State ineffectiveness	-0.435*	-0.456**	-0.716**	-0.694**	0.0463	-0.202	-0.605*	-0.531	-0.509*	-0.561**
	(0.247)	(0.231)	(0.336)	(0.310)	(0.291)	(0.191)	(0.355)	(0.333)	(0.300)	(0.270)
Political violence	0.191*	0.194**	-0.0456	-0.0483	0.169	0.217**	0.0754	0.0689	0.0683	0.0763
	(0.0982)	(0.0977)	(0.0993)	(0.0983)	(0.125)	(0.0988)	(0.101)	(0.101)	(0.104)	(0.101)
Constant	15.53***	15.79***	15.94***	15.65***	8.626**	11.56***	19.65***	18.57***	18.45***	19.14***
	(3.593)	(3.423)	(4.756)	(4.482)	(4.121)	(2.869)	(5.887)	(5.469)	(4.822)	(4.417)
Exogenous instruments	Dist. equator European lang. English lang. FR trade share	Dist. equator European lang.	Dist. equator European lang. English lang. FR trade share	Dist. equator European lang.	Dist. equator European lang. English lang. FR trade share	Dist. equator European lang.	Dist. equator European lang. English lang. FR trade share	Dist. equator European lang.	Dist. equator European lang. English lang. FR trade share	Dist. equator European lang.
Observations	91	91	86	86	79	79	196	196	165	165
R^2	0.452	0.449	0.411	0.416	0.601	0.655	0.298	0.307	0.322	0.316
p-value of LM statistic[b]	0.000141	1.75e-05	0.000506	0.000123	0.00341	0.000503	0.000447	7.72e-05	0.000335	6.61e-05
F-stat for weak ident.	8.632	15.22	8.296	11.88	7.235	11.50	9.348	12.97	10.38	13.77

Notes: The regressions were estimated using Fuller's version of LIML (Fuller, 1977; Baum et al., 2007), and the Fuller 4 version was considered (Fuller, 1977). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Panel estimates include time dummies. [a]The initial level of these three variables is considered when in the cross-country regressions. [b]The null hypothesis of the Kleibergen-Paap Lagrange Multiplier test is that the structural equation is underidentified.

APPENDIX D. APPENDICES TO CHAPTER 5

Appendix D1. Data description

Table D1.1. Variables description

	RS08 dataset (1990-2000)		Reproduced and expanded dataset (1990-2010; 1993-2012)	
Variable	Data source	Notes	Data source	Notes
GDP per capita growth	Penn World Tables v6.1	Annual average growth rate of real GDP (PPP) per capita over the relevant time period.	Penn World Tables v9.0 (Feenstra et al., 2015)	Compound annual growth rate of the ratio between real GDP at constant 2011 national prices (in mil. 2011US$) and population (in millions) over the relevant period.
GDP per capita, log	Penn World Tables v6.1	Log of per capita (PPP) GDP at the beginning of the relevant time period.	Penn World Tables v9.0 (Feenstra et al., 2015)	Logarithm of the ratio between real GDP at constant 2011 national prices (in mil. 2011US$) and population (in millions) in the first year of the period for cross-country data and in the beginning of the relevant period for panel data.
Trade policy	Wacziarg and Welch (2003)	Sachs-Warner trade policy index as updated by Wacziarg and Welch (2003) and prevailing at the beginning of the relevant time horizon or the year closest to it.	Wacziarg and Welch (2003); Clemens et al. (2012)	Sachs and Warner's (1995) index of openness, updated until 2001 by Wacziarg and Welch (2003), and then until 2005 by Clemens et al. (2012). Data for the first year available for the relevant period for cross-country data and average value for panel data.
Life expectancy	WDI (World Bank)	Life expectancy at birth at the beginning of the relevant time period.	World Bank (2016)	Level of life expectancy at birth, total (years) in the first year of the period.
Geography	Bosworth and Collins (2003)	Average of number of frost days and tropical land area.	Rajan and Subramanian (2008)	Time-invariant measure developed by Bosworth and Collins (2003), which averages the number of frost days and tropical land area.
Institutional quality	Bosworth and Collins (2003)	ICRGE index averaged over the period 1986-1995.	Teorell et al. (2016)	Arithmetic average of the ICRG indicator of quality of government over the period. It is the mean value of the ICRG variable "Corruption", "Law and Order" and "Bureaucracy Quality", scale 0-1. Higher values indicate higher quality of government.
Inflation	Easterly's Web site	Average annual rate of growth of CPI-based inflation for the first five years of the relevant time horizon.	Easterly (2009)	Logarithm of (1+inflation/100) in the first five years of the period (consumer prices) for cross-country data and average over the relevant period for panel data.
Financial depth	WDI (World Bank)	Ratio of M2/GDP for the first five years of the relevant time period.	Easterly (2009)	Average of the levels of money and quasi money (M2) as % of GDP in the first five years of the period for cross-country data and average over the relevant period for panel data.
Budget balance	WDI (World Bank)	Ratio of general government budget balance to GDP for the first five years of the relevant time period.	World Bank (2016)	Average of the levels of cash surplus/deficit (% of GDP) in first five years of the period for cross-country data and average over the relevant period for panel data.
Revolutions	Arthur S. Banks	Average number of revolutions per year in the relevant time horizon.	Aisen and Veiga (2013)	Average number of revolutions per year in the relevant time horizon from Databanks International (2009). (Data available only until 2005.)

Table D1.1. Variables description

	RS08 dataset (1990-2000)		Reproduced and expanded dataset (1990-2010; 1993-2012)	
Variable	Data source	Notes	Data source	Notes
Ethnic fractionalization	Easterly and Levine[1]	Measure of the probability that two randomly selected individuals in a country belong to different ethnolinguistic groups.	Teorell et al. (2016)	Arithmetic average of Alesina et al.'s (2003) measure of ethnic fractionalization over the period. Reflects the probability that two randomly selected people from a given country will not share the same ethnicity (which involves a combination of racial and linguistic characteristics). The higher the number the lower the probability.
Aid/GDP	OECD-DAC	Ratio of aggregate net development assistance that is disbursed in current U.S. dollars to GDP in current U.S. dollars averaged over the relevant time period.	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the annual ratios between total net ODA disbursements (current prices) and GDP (current US$) over the period.
Bilateral aid/GDP	OECD-DAC	Aid from 22 countries defined in the OECD's DAC, averaged over the relevant period.	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the annual ratios between bilateral total net ODA disbursements (current prices) and GDP (current US$) over the period.
Multilateral aid/GDP	OECD-DAC	Assistance from the World Bank, and the regional development banks, averaged over the relevant period.	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the annual ratios between multilateral total net ODA disbursements (current prices) and GDP (current US$) over the period.
Colony	Rose (2004)	Dummy that takes a value of 1 if donor and recipient country were ever in colonial relationship.	Rose (2004)	Dummy that takes a value of 1 if donor and recipient country were ever in colonial relationship.
Current colony	Rose (2004)	Dummy that takes a value of 1 if donor and recipient country enjoy a current colonial relationship.	Rose (2004)	Dummy that takes a value of 1 if donor and recipient country enjoy a current colonial relationship.
Common language			Rose (2004)	Dummy that takes a value of 1 if donor and recipient country have a common language.
Population, log			World Bank (2016)	Arithmetic average of the logarithm of "Population, total" over the period.

Notes: [1]Information obtained from the Appendix in Clemens et al. (2012) and from Easterly and Levine (1997), as there is no reference of the data source for this variable in Rajan and Subramanian (2008). 'Relevant period' corresponds to the full period in the case of cross-country datasets, and to 5-year or 10-year averages in the case of panel datasets.

Table D1.2. Description of additional variables

Variable	Data source	Notes
State ineffectiveness	Author's calculation	Index of state ineffectiveness, with higher levels representing more ineffective states. Averages across the relevant period.
Political violence	Author's calculation	Index of political violence, with higher levels representing more violent states. Averages across the relevant period.
Early-impact aid/GDP	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the ratios between early-impact aid and GDP (current US$) over the period. Early-impact aid corresponds to the aid disbursements aggregated by purpose and matched with Clemens et al.'s (2012) criteria.
Late-impact aid/GDP	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the ratios between late-impact aid and GDP (current US$) over the period. Late-impact aid

Table D1.2. Description of additional variables

Variable	Data source	Notes
		corresponds to the aid disbursements aggregated by purpose and matched with Clemens et al.'s (2012) criteria.
Humanitarian aid/GDP	OECD-DAC (2017), World Bank (2016)	Arithmetic average of the ratios between humanitarian aid and GDP (current US$) over the period. Humanitarian aid corresponds to the aid disbursements aggregated by purpose and matched with Clemens et al.'s (2012) criteria.
Distance from equator	Hall and Jones (1999)	Absolute value of "latitude" divided by 90. Time invariant.
European language	Hall and Jones (1999)	Fraction of the population speaking one of the primary languages of Western Europe: English, French, German, Portuguese, and/or Spanish. Time invariant.
Federal	Treisman (2002)	Dummy that takes the value of 1 for federal countries.
Area	World Bank (2016)	Land area in a country's total area in square kilometres. Time invariant.

Notes: 'Relevant period' corresponds to the full period in the case of cross-country datasets, and to 5-year or 10-year averages in the case of panel datasets.

Table D1.3. Samples of countries, cross-country data

RS original + fragility indices[1]	Reproduced dataset			
1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
Algeria	Algeria	Algeria	Algeria	Algeria
Argentina	Argentina	Angola	Angola	Angola
Bangladesh	Bangladesh	Argentina	Argentina	Bangladesh
Bolivia	Bolivia	Bangladesh	Bangladesh	Benin
Botswana	Botswana	Benin	Benin	Botswana
Brazil	Brazil	Bolivia	Bolivia	Brazil
Burkina Faso	Bulgaria	Botswana	Botswana	Bulgaria
Burundi	Burkina Faso	Brazil	Brazil	Burkina Faso
Cameroon	Burundi	Bulgaria	Bulgaria	Cote d'Ivoire
Chad	Cote d'Ivoire	Burkina Faso	Burkina Faso	Cape Verde
Chile	Cameroon	Burundi	Burundi	Chile
China	Chad	Cote d'Ivoire	Cote d'Ivoire	Colombia
Colombia	Chile	Cameroon	Cameroon	Congo, Dem. Rep.
Congo, Rep.	China	Cape Verde	Chile	Congo, Rep.
Costa Rica	Colombia	Chile	China	Costa Rica
Cote d'Ivoire	Congo, Rep.	China	Colombia	Cyprus
Cyprus	Costa Rica	Colombia	Congo, Rep.	Dominican Rep.
Dominican Rep.	Dominican Rep.	Congo, Dem. Rep.	Costa Rica	Egypt
Ecuador	Ecuador	Congo, Rep.	Dominican Rep.	El Salvador
Egypt	Egypt	Costa Rica	Ecuador	Ethiopia
El Salvador	El Salvador	Cyprus	Egypt	Ghana
Ethiopia	Ethiopia	Dominican Rep.	El Salvador	Guatemala
Fiji	Gabon	Ecuador	Ethiopia	Honduras
Gabon	Gambia	Egypt	Ghana	Hungary
Gambia	Ghana	El Salvador	Guatemala	India
Ghana	Haiti	Ethiopia	Haiti	Indonesia
Haiti	Hungary	Ghana	Hungary	Iran
Hungary	India	Guatemala	India	Israel
India	Indonesia	Guinea	Indonesia	Jamaica
Indonesia	Iran	Haiti	Iran	Jordan
Iran	Israel	Honduras	Israel	Kenya
Israel	Jamaica	Hungary	Jamaica	Korea, Rep.
Jamaica	Jordan	India	Jordan	Lesotho
Jordan	Kenya	Indonesia	Kenya	Madagascar
Kenya	Korea, Rep.	Iran	Korea, Rep.	Malaysia
Korea, Rep.	Lesotho	Israel	Lesotho	Mali
Lesotho	Madagascar	Jamaica	Madagascar	Mauritius
Madagascar	Malawi	Jordan	Malaysia	Morocco
Malawi	Malaysia	Kenya	Mali	Mozambique
Malaysia	Mexico	Korea, Rep.	Mauritius	Myanmar
Mexico	Morocco	Lesotho	Mexico	Nepal
Morocco	Nepal	Madagascar	Morocco	Nicaragua
Namibia	Nicaragua	Malaysia	Nepal	Nigeria
Nicaragua	Pakistan	Mali	Nicaragua	Pakistan
Pakistan	Panama	Mauritius	Pakistan	Paraguay
Panama	Paraguay	Mexico	Panama	Peru
Papua New Guinea	Peru	Morocco	Paraguay	Philippines
Paraguay	Philippines	Mozambique	Peru	Romania
Peru	Romania	Myanmar	Philippines	Russia
Philippines	Rwanda	Nepal	Romania	Rwanda
Romania	Senegal	Nicaragua	Russia	Senegal
Rwanda	Sierra Leone	Nigeria	Rwanda	Singapore
Senegal	Singapore	Pakistan	Senegal	South Africa
Sierra Leone	South Africa	Panama	Sierra Leone	Sri Lanka
Singapore	Sri Lanka	Paraguay	Singapore	Syrian Arab Rep.
South Africa	Swaziland	Peru	South Africa	Tanzania
Sri Lanka	Syrian Arab Rep.	Philippines	Sri Lanka	Thailand
Syrian Arab Rep.	Thailand	Romania	Swaziland	Togo
Thailand	Trinidad & Tobago	Russia	Syrian Arab Rep.	Trinidad & Tobago
Trinidad & Tobago	Tunisia	Rwanda	Thailand	Tunisia
Tunisia	Turkey	Senegal	Trinidad & Tobago	Turkey
Turkey	Uganda	Sierra Leone	Tunisia	Uganda
Uganda	Uruguay	Singapore	Turkey	Uruguay
Uruguay	Venezuela	South Africa	Uganda	Venezuela
Venezuela		Sri Lanka	Uruguay	Zambia
Yemen		Swaziland	Venezuela	
		Syrian Arab Rep.	Zambia	
		Tanzania		
		Thailand		
		Togo		
		Trinidad & Tobago		
		Tunisia		
		Turkey		
		Uganda		
		Uruguay		
		Venezuela		
		Zambia		

Notes: [1]Compared to the original sample, this leaves out the Congo, D.R., Mauritius, Poland, and Zimbabwe.

Table D1.4. Sample of countries, panel data

Reproduced dataset, 1993-2012	
10-year	5-year
Algeria	Algeria
Angola	Angola
Argentina	Argentina
Bangladesh	Bangladesh
Benin	Benin
Bolivia	Bolivia
Botswana	Botswana
Brazil	Brazil
Bulgaria	Bulgaria
Burkina Faso	Burkina Faso
Burundi	Burundi
Cote d'Ivoire	Cote d'Ivoire
Cameroon	Cameroon
Cape Verde	Cape Verde
Chile	Chile
China	China
Colombia	Colombia
Congo, Rep.	Congo, Dem. Rep.
Costa Rica	Congo, Rep.
Cyprus	Costa Rica
Dominican Rep.	Cyprus
Ecuador	Dominican Rep.
Egypt	Ecuador
El Salvador	Egypt
Ethiopia	El Salvador
Ghana	Ethiopia
Guatemala	Ghana
Haiti	Guatemala
Honduras	Haiti
Hungary	Honduras
India	Hungary
Indonesia	India
Iran	Indonesia
Israel	Iran
Jamaica	Israel
Jordan	Jamaica
Kenya	Jordan
Korea, Rep.	Kenya
Lesotho	Korea, Rep.
Madagascar	Lesotho
Malaysia	Madagascar
Mali	Malaysia
Mauritius	Mali
Mexico	Mauritius
Morocco	Mexico
Nepal	Morocco
Nicaragua	Mozambique
Nigeria	Myanmar
Pakistan	Nepal
Panama	Nicaragua
Paraguay	Nigeria
Peru	Pakistan
Philippines	Panama
Romania	Paraguay
Russia	Peru
Senegal	Philippines
Sierra Leone	Romania
Singapore	Russia
South Africa	Rwanda
Sri Lanka	Senegal
Swaziland	Sierra Leone
Syrian Arab Rep.	Singapore
Thailand	South Africa
Togo	Sri Lanka
Trinidad & Tobago	Swaziland
Tunisia	Syrian Arab Rep.
Turkey	Tanzania
Uganda	Thailand
Uruguay	Togo
Venezuela	Trinidad & Tobago
Zambia	Tunisia
	Turkey
	Uganda
	Uruguay
	Venezuela
	Zambia

Table D1.5. Correlation between the variables in RS08's original dataset and the reproduced dataset, 1990-2000

Variables	Cross-country
GDP per capita growth	0.8742
GDP per capita, log	0.9446
Trade policy	0.9414
Life expectancy	0.9680
Geography	1.0000
Institutional quality	0.8973
Inflation	0.8746
Financial depth	0.9522
Budget balance	1.0000
Revolutions	0.9132
Ethnic fractionalization	0.7263
Aid/GDP	0.9685

Notes: Depending on the variable, the number of observations varies between 63 and 69.

Table D1.6. Descriptive statistics, RS08's original dataset with fragility indices, 1990-2000

	Obs	Mean	Std. Dev	Min	Max
Real GDP per capita growth	66	1.24214	2.38867	-5.536778	7.407498
Log(initial pc GDP)	66	8.028449	.8329109	6.352316	9.79439
Initial policy	66	.4090909	.4954337	0	1
Initial life expectancy	66	61.61091	9.988963	35.2	76.54
Geography	66	-.4329688	.813743	-1.04	1.527951
ICRG	66	.5484697	.1188759	.236	.859
Log(1+inflation)	66	107.6684	378.4882	1.114526	2096.274
Initial M2/GDP	66	35.13948	21.22671	3.862385	117.1367
Initial budget balance	66	-1.661999	3.630742	-10.5306	12.70568
Revolutions	66	.280303	.4073251	0	1.6
Ethnic fractionalization	66	.4164578	.2980697	.0041175	.8994653
Sub-Saharan Africa	66	.3181818	.4693397	0	1
East Asia	66	.1363636	.345804	0	1
Aid/GDP	66	4.699653	6.127432	.0295344	26.94649
State ineffectiveness	66	.4614557	1.723084	-3.807462	3.531245
Political violence	66	.5492936	1.899655	-1.841866	7.290517

Table D1.7. Descriptive statistics, reproduced dataset, 1990-2000

	Obs	Mean	Std. Dev	Min	Max
Real GDP per capita growth	64	1.293641	2.385084	-7.773154	6.218605
Log(initial pc GDP)	64	8.384289	.9460043	6.449125	10.25989
Initial policy	64	.4375	.5	0	1
Initial life expectancy	64	62.31443	9.609758	33.48512	76.60732
Geography	64	-.3748638	.8567415	-1.04	1.527951
Log(1+inflation)	64	.3323517	.640733	.0110836	3.089347
Initial M2/GDP	64	38.62677	22.74804	9.878743	119.4378
Initial budget balance	64	-1.528535	3.588863	-7.993786	12.70568
Revolutions	64	.2550347	.3361867	0	1.2
Ethnic fractionalization	64	.4932778	.2537445	.001998	.930175
Sub-Saharan Africa	64	.328125	.4732424	0	1
East Asia	64	.109375	.3145764	0	1
Aid/GDP	64	5.637919	7.112306	-.006786	29.75717
State ineffectiveness	64	.5149051	1.671475	-3.807462	3.531245
Political violence	64	.6034927	1.892444	-1.841866	7.290517

Table D1.8. Descriptive statistics, reproduced dataset, 1993-2012, cross-country data

	Obs	Mean	Std. Dev.	Minimum	Maximum
	1993-2012				
Real GDP pc growth	77	2.350472	1.72037	-2.011328	8.653811
Log(initial pc GDP)	77	8.308417	1.001024	5.876279	10.41507
Initial policy	77	.6363636	.4842001	0	1
Initial life expectancy	77	61.85402	10.56143	27.0789	77.15366
Geography	77	-.4220614	.851626	-1.04	1.783878
Log(1+inflation)	77	.2980229	.6257046	.0105376	4.007075
Initial M2/GDP	77	40.0761	28.28284	9.52279	186.1762
Initial budget balance	77	-1.464987	3.177833	-8.79525	13.66614
Revolutions	77	.2691475	.3837773	0	1.538462
Ethnic fractionalization	77	.50066	.2517501	.001998	.930175
Sub-Saharan Africa	77	.3766234	.4877165	0	1
East Asia	77	.1038961	.3071266	0	1
Aid/GDP	77	4.933385	6.490668	-.0206947	24.97945
State ineffectiveness	77	.7878289	1.780522	-3.691642	4.168341
Political violence	77	.4985314	1.826155	-1.690894	7.550156

	Obs	Mean	Std. Dev.	Minimum	Maximum
	1993-2002				
Real GDP pc growth	67	1.556851	1.88065	-3.612879	6.492055
Log(initial pc GDP)	67	8.434273	.931777	6.340054	10.41507
Initial policy	67	.6716418	.4731602	0	1
Initial life expectancy	67	62.61973	10.38658	27.0789	77.15366
Geography	67	-.3604415	.8842396	-1.04	1.783878
Log(1+inflation)	67	.2558634	.4874906	.0105376	2.982069
Initial M2/GDP	67	39.70128	23.26884	11.45173	117.0675
Initial budget balance	67	-1.444747	3.500704	-8.79525	13.66614
Revolutions	67	.2638474	.3881539	0	1.4
Ethnic fractionalization	67	.488718	.2486682	.001998	.930175
Sub-Saharan Africa	67	.3283582	.4731602	0	1
East Asia	67	.1044776	.3081877	0	1
Aid/GDP	67	4.753773	6.551538	-.0171153	30.84536
State ineffectiveness	67	.5354028	1.673504	-3.756652	4.029685
Political violence	67	.5628192	1.998819	-1.786807	7.658358

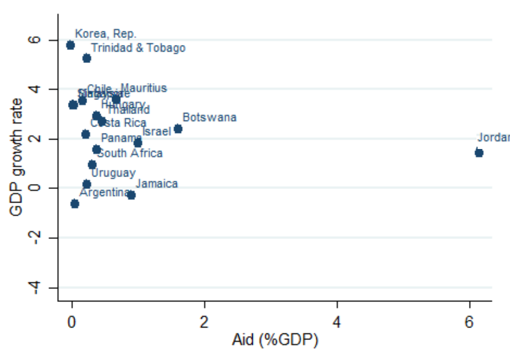
	Obs	Mean	Std. Dev.	Minimum	Maximum
	2003-2012				
Real GDP pc growth	65	3.128478	1.791093	-1.072815	10.11893
Log(initial pc GDP)	65	8.539157	1.02714	6.319989	10.67923
Initial policy	65	.8153846	.3910046	0	1
Initial life expectancy	65	64.71609	10.14917	43.82476	79.64878
Geography	65	-.4074492	.8645372	-1.04	1.783878
Log(1+inflation)	65	.0731004	.0540953	.0083783	.3224911
Initial M2/GDP	65	50.8794	33.32756	5.184048	186.1762
Initial budget balance	65	-.9352023	3.542243	-8.528645	8.619019
Revolutions	65	.2641026	.4990375	0	2.333333
Ethnic fractionalization	65	.5043528	.2455052	.001998	.930175
Sub-Saharan Africa	65	.3692308	.4863522	0	1
East Asia	65	.1076923	.3124038	0	1
Aid/GDP	65	3.946254	5.294242	-.1209145	19.12287
State ineffectiveness	65	.6511097	1.847289	-3.662749	4.306918
Political violence	65	.5015755	1.891399	-1.793778	7.429932

Table D1.9. Descriptive statistics, reproduced dataset, 1993-2012, panel data

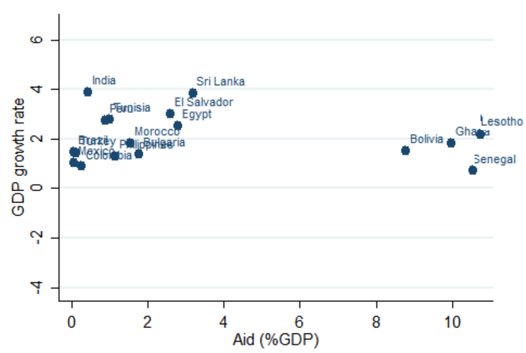
	Obs	Mean	Std. Dev.	Minimum	Maximum	Obs	Mean	Std. Dev.	Minimum	Maximum
	10-year averages (1993-2012)					5-year averages (1993-2012)				
Real GDP pc growth	179	2.427099	2.529156	-10.00383	8.715956	132	2.330758	1.992804	-3.612879	10.11893
Log(initial pc GDP)	179	8.540899	.9069486	6.238213	10.64337	132	8.406227	.9575756	6.157898	10.58642
Initial policy	179	.8115456	.3692835	0	1	132	.7967172	.3780863	0	1
Initial life expectancy	179	64.20347	9.161249	37.4122	78.9239	132	62.35798	9.715595	38.8038	78.27317
Geography	179	-.3236858	.8925682	-1.04	1.783878	132	-.3835892	.8715702	-1.04	1.783878
Log(1+inflation)	179	.1266329	.2406075	-.0110155	2.217585	132	.1350666	.2757063	.0098659	2.425354
Initial M2/GDP	179	47.52405	29.8158	11.45173	206.8786	132	47.66349	29.92461	7.762822	186.1762
Initial budget balance	179	-1.370396	3.481877	-10.95463	13.66614	132	-1.489066	3.269502	-8.051939	14.80713
Revolutions	179	.2457169	.4332652	0	2.333333	132	.2639731	.4444935	0	2.333333
Ethnic fractionalization	179	.4826888	.2484842	.001998	.930175	132	.496417	.2462961	.001998	.930175
Sub-Saharan Africa	179	.2905028	.4552679	0	1	132	.3484848	.4783057	0	1
East Asia	179	.1117318	.3159199	0	1	132	.1060606	.3090882	0	1
Aid/GDP	179	3.662953	5.044175	-.1789361	22.90228	132	4.356131	5.956756	-.1209145	30.84536
State ineffectiveness	179	.4240124	1.677747	-3.77715	4.05592	132	.5923797	1.75543	-3.756652	4.306918
Political violence	179	.4479939	1.94087	-1.883422	7.70021	132	.5326613	1.939476	-1.793778	7.658358

Figure D1.1. GDP per capita growth rates versus aid for different quartiles of state ineffectiveness and for different quartiles of political violence, 1993-2002

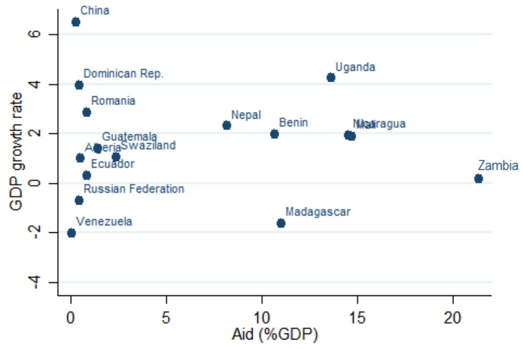
Different quartiles of the state ineffectiveness index



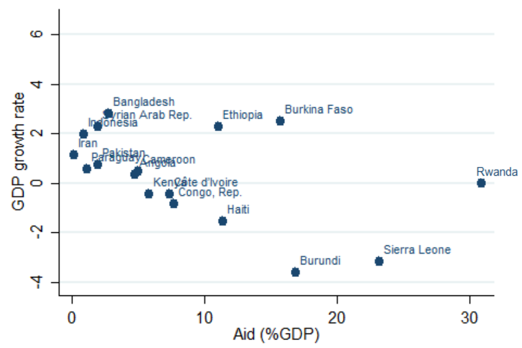
a. SI score below -0.43



b. SI score above -0.43 and below 0.609

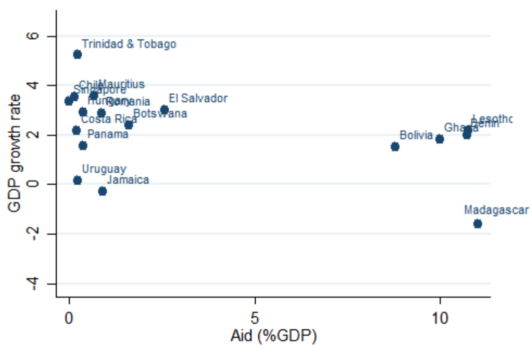


c. SI score above 0.609 and below 1.648

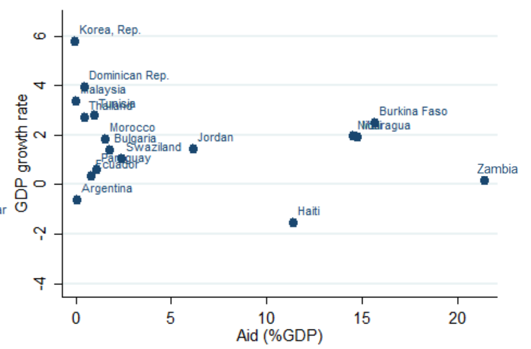


d. SI score above 1.648

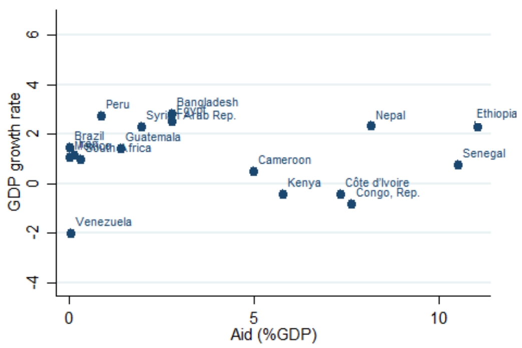
Different quartiles of the political violence index



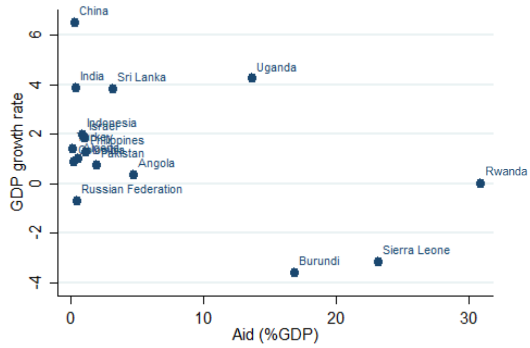
a. SI score below -0.949



b. SI score above -0.949 and below -0.093



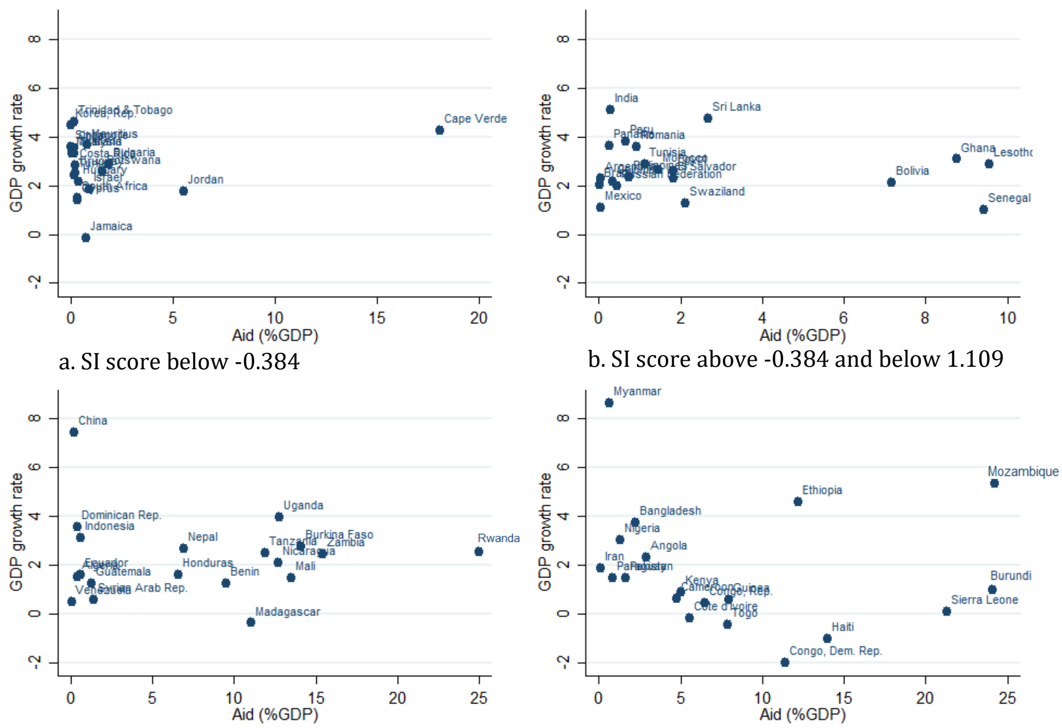
c. SI score above -0.093 and below 1.649



d. SI score above 1.649

Figure D1.2. GDP per capita growth rates versus aid for different quartiles of state ineffectiveness and for different quartiles of political violence, 2003-2012

Different quartiles of the state ineffectiveness index



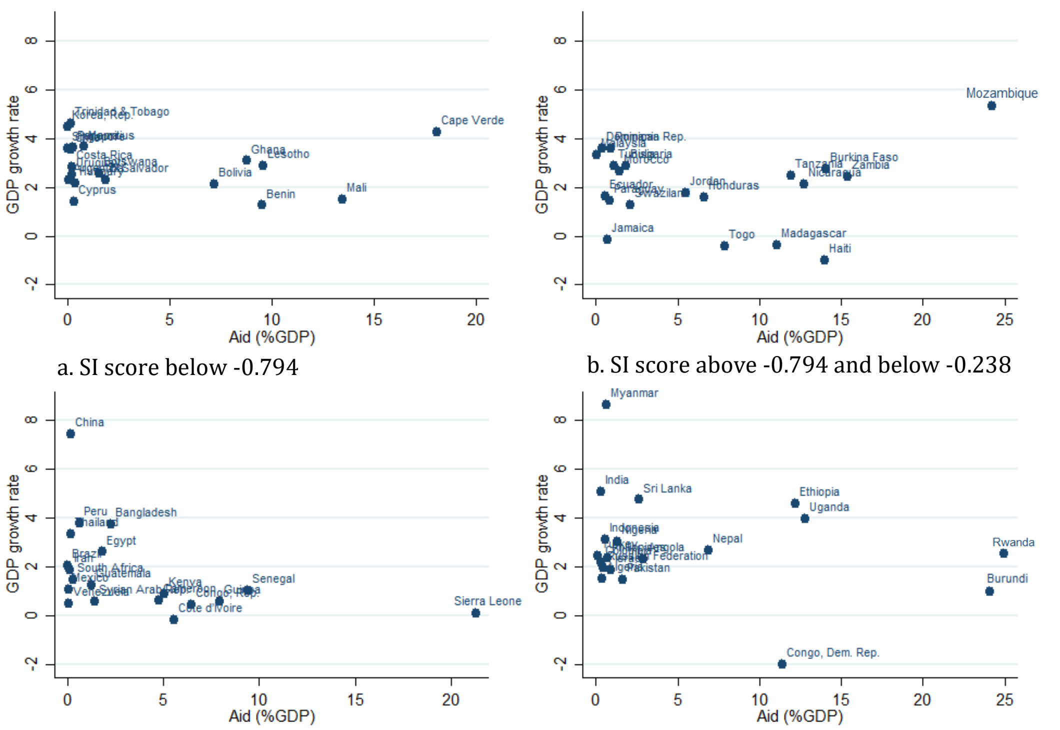
a. SI score below -0.384

b. SI score above -0.384 and below 1.109

c. SI score above 1.109 and below 1.937

d. SI score above 1.937

Different quartiles of the political violence index



a. SI score below -0.794

b. SI score above -0.794 and below -0.238

c. SI score above -0.238 and below 1.692

d. SI score above 1.692

Appendix D2. Diagnostic tests

Table D2.1. Correlation matrix, RS08s's original dataset with fragility indices, 1990-2000

	GDP per capita	Trade policy	Life expectancy	Geography	Inst. quality	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1														
Trade policy	0.3639	1													
Life expectancy	**0.8120**	0.3916	1												
Geography	0.3376	0.1429	0.3713	1											
Inst. quality	0.6362	0.2843	0.4776	0.3308	1										
Inflation	0.0620	-0.1946	0.1046	-0.0632	-0.0036	1									
M2	0.3715	0.2380	0.4633	0.3253	0.4260	-0.1973	1								
Budget balance	0.3185	0.2784	0.2592	-0.0343	0.2332	-0.2129	0.1589	1							
Revolutions	-0.1156	-0.0281	-0.1479	-0.1567	-0.2332	0.1288	-0.2893	-0.1789	1						
Ethnic fractionalization	-0.2256	-0.1716	-0.3986	-0.3029	-0.0565	-0.1258	-0.1499	-0.0744	0.0126	1					
SSA	-0.5553	-0.3037	**-0.7883**	-0.2781	-0.1312	-0.1685	-0.4131	-0.0864	-0.0552	0.4770	1				
East Asia	0.2084	0.2082	0.2103	-0.0224	0.3083	-0.1070	0.3737	0.2495	-0.0025	0.1155	-0.2714	1			
Aid	**-0.7180**	-0.2822	**-0.7371**	-0.3750	-0.3809	0.1956	-0.3674	-0.2419	0.1267	0.1396	0.6072	-0.2100	1		
State ineffectiveness	**-0.7611**	-0.5206	**-0.7059**	-0.3187	-0.6767	-0.0074	-0.4482	-0.3754	0.2294	0.1473	0.3855	-0.1972	0.5039	1	
Political violence	-0.2846	-0.1941	-0.2461	-0.0875	-0.2617	-0.0095	-0.0876	-0.4007	0.6535	0.1899	0.0139	0.0055	0.0863	0.3574	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 66 countries for which all necessary data were available.

Table D2.2. Correlation matrix, reproduced dataset, cross-country data, 1990-2000

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.3283	1												
Life expectancy	**0.8108**	0.3654	1											
Geography	0.2921	0.1077	0.3514	1										
Inflation	0.1410	-0.2242	0.1337	0.0274	1									
M2	0.4210	0.2004	0.5477	0.3231	-0.1015	1								
Budget balance	0.2936	0.4051	0.3083	-0.1109	-0.2320	0.1756	1							
Revolutions	-0.2676	-0.0868	-0.2800	-0.2734	0.1366	-0.2618	-0.2423	1						
Ethnic fractionalization	-0.2737	-0.2941	-0.4476	-0.4317	-0.0182	-0.2407	-0.1777	-0.0011	1					
SSA	-0.5629	-0.2138	**-0.7531**	-0.3043	-0.2188	-0.5022	-0.0888	0.0144	0.4893	1				
East Asia	0.1763	0.2964	0.2571	0.0178	-0.1462	0.4312	0.3306	0.0172	-0.1424	-0.2449	1			
Aid	**-0.7650**	-0.2797	**-0.8105**	-0.3309	0.0203	-0.3721	-0.2452	0.2553	0.2792	0.6131	-0.2508	1		
State ineffectiveness	-0.6622	-0.5423	-0.6932	-0.2927	-0.0447	-0.4735	-0.3857	0.2667	0.3163	0.4258	-0.2387	0.5243	1	
Political violence	-0.2790	-0.2424	-0.2822	-0.1101	-0.0425	-0.0727	-0.4402	**0.7428**	0.0640	0.0029	0.0520	0.1023	0.3283	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 64 countries for which all necessary data were available.

Table D2.3. Correlation matrix, reproduced dataset, cross-country data, 1993-2012

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.4211	1												
Life expectancy	**0.7898**	0.4545	1											
Geography	0.3781	0.1166	0.3666	1										
Inflation	-0.0314	-0.1793	-0.1839	0.0431	1									
M2	0.4529	0.1872	0.5342	0.2408	-0.1605	1								
Budget balance	0.1967	0.1720	0.1426	-0.1488	-0.1263	0.1386	1							
Revolutions	-0.1830	-0.2008	-0.2366	-0.2032	0.2040	-0.2519	-0.1724	1						
Ethnic fractionalization	-0.4001	-0.1893	-0.5249	-0.4522	0.1728	-0.3124	-0.1210	0.0956	1					
SSA	-0.6239	-0.2482	**-0.7686**	-0.3490	0.1117	-0.4023	-0.0201	-0.0188	0.5335	1				
East Asia	0.1432	0.0804	0.2229	0.0058	-0.1183	0.3591	0.3479	0.0945	-0.1297	-0.2647	1			
Aid	**-0.7624**	-0.3107	**-0.7635**	-0.3423	0.0117	-0.3517	-0.1301	0.1355	0.2984	0.6476	-0.2447	1		
State ineffectiveness	-0.6720	-0.5790	-0.6375	-0.3507	0.2489	-0.5391	-0.2530	0.3105	0.4431	0.3379	-0.1265	0.4017	1	
Political violence	-0.2437	-0.4210	-0.2410	-0.0427	0.2954	-0.1307	-0.2992	**0.7117**	0.1502	-0.0522	0.1390	-0.0216	0.4080	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 77 countries for which all necessary data were available.

Table D2.4. Correlation matrix, reproduced dataset, cross-country data, 1993-2002

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.3445	1												
Life expectancy	**0.7864**	0.3899	1											
Geography	0.3314	0.0684	0.3364	1										
Inflation	0.1492	-0.1007	-0.1158	0.1397	1									
M2	0.3993	0.1086	0.5151	0.2010	-0.0896	1								
Budget balance	0.2143	0.1359	0.1788	-0.1475	-0.0206	0.2090	1							
Revolutions	-0.1741	-0.1729	-0.2541	-0.2011	0.1122	-0.2799	-0.1564	1						
Ethnic fractionalization	-0.3288	-0.0838	-0.4490	-0.4395	0.0660	-0.1948	-0.0773	0.0606	1					
SSA	-0.6078	-0.1879	**-0.7623**	-0.3128	0.0168	-0.4260	-0.0333	0.0161	0.4797	1				
East Asia	0.2141	0.1349	0.2447	0.0112	-0.1373	0.5291	0.3784	-0.0059	-0.1353	-0.2388	1			
Aid	**-0.7617**	-0.2811	**-0.8548**	-0.3359	-0.0835	-0.4170	-0.1861	0.1870	0.3292	0.6418	-0.2284	1		
State ineffectiveness	-0.6625	-0.5615	-0.6632	-0.2733	0.1817	-0.4750	-0.2428	0.3095	0.3274	0.3576	-0.2234	0.5100	1	
Political violence	-0.2265	-0.4230	-0.3168	-0.0664	0.2399	-0.0918	-0.2567	**0.7224**	0.0902	0.0261	0.0200	0.1054	0.3944	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 67 countries for which all necessary data were available.

Table D2.5. Correlation matrix, reproduced dataset, cross-country data, 2003-2012

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.1339	1												
Life expectancy	**0.7356**	0.1606	1											
Geography	0.3903	-0.0023	0.2729	1										
Inflation	-0.1353	-0.3761	-0.2167	-0.1098	1									
M2	0.5840	0.1909	0.5955	0.2752	-0.4151	1								
Budget balance	0.1144	-0.1939	-0.1625	0.0622	0.0798	-0.1562	1							
Revolutions	-0.1333	-0.1466	-0.0603	-0.1335	-0.0716	-0.1568	-0.0834	1						
Ethnic fractionalization	-0.5036	-0.0937	-0.6311	-0.4304	0.1628	-0.4230	0.0553	0.0842	1					
SSA	-0.6432	-0.0468	**-0.8559**	-0.3538	0.0877	-0.4237	0.0957	-0.0862	0.6043	1				
East Asia	0.2200	0.0374	0.2212	-0.1001	-0.0937	0.3429	0.0655	0.2156	-0.0899	-0.2658	1			
Aid	**-0.8012**	-0.0563	-0.6084	-0.3090	-0.0020	-0.4039	-0.0412	0.0120	0.4193	**0.7015**	-0.2495	1		
State ineffectiveness	-0.6842	-0.4373	-0.5546	-0.3483	0.4048	-0.6489	0.1166	0.1955	0.5275	0.3001	-0.1170	0.3623	1	
Political violence	-0.2192	-0.3798	-0.0969	-0.0223	0.1836	-0.1449	-0.1565	0.6697	0.1845	-0.1520	0.1405	-0.0637	0.4159	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 65 countries for which all necessary data were available.

Table D2.6. Correlation matrix, reproduced dataset, panel data, 1993-2012 (5-year periods)

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.1248	1												
Life expectancy	**0.7756**	0.2036	1											
Geography	0.3094	-0.0935	0.2858	1										
Inflation	0.1444	-0.1139	-0.0211	0.1635	1									
M2	0.4342	0.0928	0.5295	0.1890	-0.1580	1								
Budget balance	0.1306	-0.0841	-0.0650	-0.0557	-0.1258	-0.0271	1							
Revolutions	-0.0741	-0.1074	-0.0886	-0.1398	0.0300	-0.1825	-0.1325	1						
Ethnic fractionalization	-0.3914	-0.0506	-0.5661	-0.4292	-0.0146	-0.2676	0.0023	0.0623	1					
SSA	-0.5878	-0.0267	**-0.7891**	-0.2855	-0.0586	-0.3798	0.1250	-0.0905	0.5314	1				
East Asia	0.2222	0.0852	0.2409	-0.0361	-0.1150	0.4874	0.1861	0.0965	-0.1143	-0.2269	1			
Aid	**-0.7451**	-0.0497	-0.6841	-0.2957	-0.0738	-0.3454	-0.0377	-0.0132	0.4133	0.6082	-0.2350	1		
State ineffectiveness	-0.6549	-0.4258	-0.6229	-0.2586	0.0892	-0.5243	-0.0355	0.1838	0.3778	0.3189	-0.2238	0.3980	1	
Political violence	-0.1788	-0.4012	-0.1925	-0.0292	0.0983	-0.0811	-0.2079	0.6912	0.1241	-0.0671	0.0475	-0.0483	0.3138	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for 179 observations.

Table D2.7. Correlation matrix, reproduced dataset, panel data, 1993-2012 (10-year periods)

	GDP per capita	Trade policy	Life expectancy	Geography	Inflation	M2	Budget balance	Revolutions	Ethnic fractionalization	SSA	East Asia	Aid	State ineffectiveness	Political violence
GDP per capita	1													
Trade policy	0.1702	1												
Life expectancy	**0.7820**	0.2871	1											
Geography	0.3502	-0.0147	0.3301	1										
Inflation	0.1253	-0.1775	-0.1209	0.0814	1									
M2	0.4734	0.1696	0.5793	0.2534	-0.1749	1								
Budget balance	0.1406	-0.0852	-0.0330	-0.0429	0.0560	-0.0170	1							
Revolutions	-0.1302	-0.1993	-0.1449	-0.1624	0.0700	-0.2022	-0.0954	1						
Ethnic fractionalization	-0.3830	-0.0630	-0.5546	-0.4356	0.0638	-0.3199	0.0339	0.0729	1					
SSA	-0.6062	-0.0949	**-0.7792**	-0.3336	0.0171	-0.4134	0.0991	-0.0410	0.5420	1				
East Asia	0.1673	0.0553	0.2387	-0.0435	-0.1026	0.4483	0.1779	0.1169	-0.1127	-0.2519	1			
Aid	**-0.7490**	-0.1808	**-0.7402**	-0.3201	-0.0440	-0.4133	-0.1058	0.0963	0.3635	0.6586	-0.2361	1		
State ineffectiveness	-0.6314	-0.4800	-0.6389	-0.3117	0.1571	-0.5721	0.0009	0.2427	0.4302	0.3282	-0.1676	0.4203	1	
Political violence	-0.2076	-0.4601	-0.2186	-0.0451	0.2061	-0.1295	-0.2065	0.6858	0.1344	-0.0609	0.0779	0.0343	0.4032	1

Notes: Values higher than 0.7 highlighted in bold. Correlations are calculated for the 66 countries for 132 observations.

Table D2.8. Variance inflation factors, RS08's original dataset

1990-00, *70 obs.*		With fragility, 1990-00, *66 obs.*	
Variable	VIF	Variable	VIF
Life expectancy	7.19	Life expectancy	7.92
GDP per capita	4.94	SSA	5.54
SSA	4.23	GDP per capita	5.37
Institutional quality	2.96	State ineffectiveness	4.28
Aid	2.70	Aid	3.86
Ethnic fractionalization	1.78	Inst. quality	2.99
M2	1.70	Political violence	2.71
East Asia	1.58	Revolutions	2.41
Geography	1.47	M2	2.06
Budget balance	1.45	Ethnic fractionalization	1.82
Inflation	1.33	Inflation	1.67
Trade policy	1.32	East Asia	1.64
Revolutions	1.29	Trade policy	1.63
		Budget balance	1.58
		Geography	1.46
Mean VIF	2.61	Mean VIF	3.13

Table D2.9. Variance inflation factors, reproduced dataset, cross-country data

1990-2000, *64 obs.*		1993-2012, *77 obs.*		1993-2002, *67 obs.*		2003-2012, *65 obs.*	
Variable	VIF	Variable	VIF	Variable	VIF	Variable	VIF
Life exp.	8.42	Life exp.	6.66	Life exp.	11.72	GDP per capita	10.34
Aid	5.10	GDP per capita	5.31	Aid	6.09	SSA	8.55
Pol. violence	4.27	Aid	4.72	GDP per capita	4.27	Life exp.	8.48
GDP per capita	3.82	Pol. violence	4.01	Pol. violence	4.06	State ineffec.	5.56
Revolutions	3.71	State ineffec.	3.96	State ineffec.	3.68	Aid	5.08
SSA	3.26	SSA	3.66	SSA	3.40	Pol. violence	3.50
State ineffec.	2.86	Revolutions	2.87	Revolutions	3.03	M2	2.85
M2	2.46	M2	1.98	M2	2.45	Ethnic frac.	2.54
Budget balance	1.99	Trade policy	1.94	Trade policy	1.91	Revolutions	2.46
Trade policy	1.84	Ethnic frac.	1.94	East Asia	1.77	Trade policy	1.79
Ethnic frac.	1.82	Geography	1.65	Ethnic frac.	1.66	Geography	1.69
Geography	1.69	East Asia	1.54	Geography	1.55	Inflation	1.65
Inflation	1.59	Inflation	1.52	Budget balance	1.51	Budget balance	1.48
East Asia	1.53	Budget balance	1.28	Inflation	1.47	East Asia	1.44
Mean VIF	3.17	Mean VIF	3.08	Mean VIF	3.47	Mean VIF	4.10

Table B2.10. Variance inflation factors, reproduce dataset, panel data

5-year, *179 obs.*		10-year, *132 obs.*	
Variable	VIF	Variable	VIF
Life expectancy	6.68	Life expectancy	6.72
GDP per capita	5.32	GDP per capita	4.95
SSA	3.60	SSA	3.69
State ineffec.	3.20	State ineffec.	3.49
Pol. violence	3.17	Pol. violence	3.41
Aid	3.01	Aid	3.36
Revolutions	2.45	Revolutions	2.38
M2	2.24	M2	2.30
Ethnic frac.	1.85	Ethnic frac.	1.93
Trade policy	1.71	Trade policy	1.88
East Asia	1.55	East Asia	1.51
Geography	1.42	Geography	1.45
Budget balance	1.35	Budget balance	1.33
Inflation	1.25	Inflation	1.31
Mean VIF	2.77	Mean VIF	2.84

Appendix D3. Additional estimations

Table D3.1. Robustness checks to Rajan and Subramanian's (2008) instrument using the logarithm of population, cross-country data

Results A: Addition of log(pop) as control

	Dependent variable: real GDP per capita growth				
	RS08 original	RS08 reconstructed			
	1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
	(1)	(2)	(3)	(4)	(5)
Aid/GDP	0.171	-0.000907	-0.0688	-0.00133	-0.287
	(1.154)	(0.164)	(0.146)	(0.203)	(1.011)
Log(pop)	0.615	1.56e-09	2.49e-09*	3.20e-09**	0
	(1.693)	(1.58e-09)	(1.29e-09)	(1.43e-09)	(6.31e-09)
Observations	66	64	77	67	65
R^2	0.592	0.655	0.494	0.542	0.337
p-value of LM statistic[a]	0.674	0.0634	0.0451	0.0194	0.523
F-stat for weak ident.	0.134	2.471	5.757	5.095	0.341

Results B: Log(pop) as instrument (second-stage)

	Dependent variable: real GDP per capita growth				
	RS08 original	RS08 reconstructed			
	1990-2000	1990-2000	1993-2012	1993-2002	2003-2012
	(1)	(2)	(3)	(4)	(5)
Aid/GDP	-0.241**	-0.224	-0.507**	-0.674*	-0.284
	(0.116)	(0.179)	(0.221)	(0.403)	(0.194)
Observations	66	64	77	67	65
R^2	0.610	0.529	-0.058	-0.049	0.340
p-value of LM statistic[a]	0.00560	0.0124	0.0236	0.0297	0.0838
F-stat for weak ident.	8.640	9.353	10.61	3.791	8.402

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified. [b]p-value of Hansen J statistic, whish tests the overidentifying restrictions.

Table D3.2. IV results with bilateral and multilateral aid, cross-country and panel data

	CROSS-COUNTRY DATA									PANEL DATA					
	Dependent variable: real GDP per capita growth									Dependent variable: real GDP per capita growth					
	Results A: Bilateral aid														
	20-year			10-year						1993-2012					
	1993-2012			1993-2002			2003-2012			5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Bilateral aid/GDP	-0.349*	0.0818	0.254	-0.367*	-0.730	5.073	-4.425	-2.765	-1.349	-0.517	-0.530	-0.277	-0.526**	-0.343	-0.246
	(0.183)	(0.301)	(0.585)	(0.197)	(1.689)	(205.5)	(14.43)	(3.773)	(2.538)	(0.452)	(0.729)	(0.497)	(0.240)	(0.373)	(0.830)
Bilateral aid x SI		-0.323*	-0.231		0.266	-7.517		-0.358	-0.909		-0.293	-0.144		-0.418	-0.821
		(0.175)	(0.379)		(1.143)	(292.0)		(0.758)	(1.100)		(0.570)	(0.527)		(0.278)	(1.175)
Bilateral aid x PV		0.0325	0.185		-0.0345	-3.135		0.425	-0.281		0.179	0.254		0.204	-0.437
		(0.0805)	(0.459)		(0.131)	(124.1)		(0.698)	(0.834)		(0.250)	(0.230)		(0.171)	(1.092)
Bilateral aid x SI x PV			-0.156			2.712			0.402			-0.120			0.432
			(0.468)			(107.3)			(0.489)			(0.127)			(0.839)
Observations	77	77	77	67	67	67	65	65	65	179	179	179	132	132	132
R^2	0.376	0.177	0.104	0.473	0.256	-179.642	-16.057	-7.492	-8.212	0.319	-0.034	0.273	0.335	-0.341	-4.751
p-value of LM statistic[a]	0.00176	0.0369	0.724	0.000399	0.493	0.980	0.749	0.350	0.357	0.0121	0.207	0.197	0.00500	0.0385	0.600
F-stat for weak ident.	12.13	1.492	0.0236	13.26	0.107	0.000115	0.0774	0.209	0.153	6.015	0.524	0.410	9.477	1.707	0.0616
	Results B: Multilateral aid														
	20-year			10-year						1993-2012					
	1993-2012			1993-2002			2003-2012			5-year			10-year		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Multilateral aid /GDP	-0.858*	0.375	-3.464	-0.773*	0.703	-0.615	1.974	3.355	2.801	-0.950	-8.497	-1.790	-1.048**	-1.585	-0.191
	(0.440)	(1.192)	(135.9)	(0.410)	(18.81)	(1.099)	(2.017)	(5.105)	(3.853)	(1.025)	(47.54)	(4.036)	(0.525)	(3.027)	(2.420)
Multilateral aid x SI		-0.699	14.67		-1.992	-0.273		0.254	0.675		-0.772	-0.156		-2.266	2.645
		(0.529)	(576.3)		(24.96)	(1.814)		(1.575)	(1.686)		(7.623)	(1.649)		(3.659)	(10.35)
Multilateral aid x PV		0.149	16.91		0.897	0.249		-1.188	-0.649		2.368	1.017		1.740	0.972
		(0.243)	(629.3)		(10.53)	(0.524)		(1.228)	(1.618)		(15.04)	(2.338)		(2.944)	(1.884)
Multilateral aid x SI x PV			-12.67			-0.0327			-0.278			-0.237			-1.144
			(476.9)			(0.250)			(0.802)			(0.319)			(2.672)
Observations	77	77	77	67	67	67	65	65	65	179	179	179	132	132	132
R^2	0.224	-0.373	-1,161.12	0.443	-3.646	0.326	-0.537	-5.152	-5.500	0.330	-22.133	-0.823	0.206	-10.923	-12.505
p-value of LM statistic[a]	0.0136	0.122	0.979	0.00814	0.927	0.578	0.209	0.318	0.265	0.204	0.869	0.644	0.0333	0.525	0.714
F-stat for weak ident.	5.963	0.760	0.000131	7.787	0.00202	0.0477	1.228	0.228	0.206	1.372	0.00812	0.0507	4.455	0.112	0.0284

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, and the interaction between the latter two variables. Robust and cluster robust standard errors in parentheses for cross-country and panel estimates, respectively. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.

Table D3.3. IV results with early-impact, long-impact and humanitarian aid, cross-country and panel data

	CROSS-COUNTRY DATA									PANEL DATA					
	Dependent variable: real GDP per capita growth									Dependent variable: real GDP per capita growth					
	Results A: Early-impact aid														
	20-year			10-year						1993-2012					
	1993-2012 (73 obs.)			1993-2002 (63 obs.)			2003-2012 (57 obs.)			5-year (160 obs.)			10-year (120 obs.)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Early-impact aid/GDP	-0.260	-0.0969	-0.0177	-0.531	-2.744	0.624	-0.804	0.775	1.783	-0.708	-0.449	2.675	-1.248	-1.214	0.674
	(0.619)	(0.635)	(0.503)	(0.671)	(6.814)	(1.262)	(0.842)	(6.093)	(2.950)	(0.934)	(2.099)	(13.56)	(1.278)	(1.614)	(0.694)
Early-impact aid x SI		-0.134	-0.151		1.209	-0.572		-1.017	-1.524		-0.525	-3.000		-0.460	-0.707
		(0.152)	(0.155)		(3.670)	(0.564)		(3.269)	(1.764)		(1.754)	(10.81)		(0.488)	(0.434)
Early-impact aid x PV		-0.0842	-0.0964		0.291	-0.259		0.271	0.294		0.193	-0.464		0.160	-0.187
		(0.127)	(0.148)		(0.980)	(0.266)		(1.212)	(1.553)		(0.319)	(3.228)		(0.283)	(0.236)
Early-impact aid x SI x PV			0.0461			0.284			0.0423			0.635			0.179**
			(0.151)			(0.394)			(0.369)			(3.610)			(0.0902)
R^2	0.545	0.596	0.575	0.434	-2.185	0.121	0.242	-2.178	-4.434	0.259	-0.298	-6.431	-0.219	-1.665	-0.020
p-value of LM statistic[a]	0.168	0.179	0.553	0.0323	0.651	0.0815	0.0751	0.750	0.346	0.166	0.559	0.784	0.296	0.224	0.0573
F-stat for weak ident.	1.538	0.467	0.0671	3.383	0.0485	0.626	2.109	0.0231	0.169	1.714	0.102	0.0161	0.960	0.458	0.839
	Results B: Late-impact aid														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Late-impact aid /GDP	-0.173	0.164	-0.852	-0.521	-2.773	0.377	-0.472	1.831	1.555	-0.451	0.405	0.544	-0.412*	0.512	1.019
	(0.290)	(0.470)	(29.08)	(0.557)	(9.552)	(0.549)	(0.434)	(1.546)	(1.467)	(0.507)	(1.879)	(19.06)	(0.232)	(0.710)	(0.851)
Late-impact aid x SI		-0.258	0.977		1.188	-0.460		-1.420	-1.955		-0.750	-0.887		-0.836	-1.169*
		(0.253)	(36.93)		(4.680)	(0.333)		(1.071)	(2.110)		(1.193)	(18.06)		(0.508)	(0.702)
Late-impact aid x PV		0.0590	4.147		-0.189	-0.150		0.393	1.282		0.307	0.294		0.312	0.0989
		(0.0982)	(121.2)		(0.689)	(0.304)		(0.553)	(2.078)		(0.347)	(1.323)		(0.241)	(0.521)
Late-impact aid x SI x PV			-3.373			0.113			-0.308			0.0482			0.182
			(100.5)			(0.187)			(0.694)			(5.915)			(0.413)
R^2	0.559	0.560	-96.218	0.468	-2.268	0.251	0.313	-2.889	-5.563	0.361	-0.273	-0.599	0.489	-0.459	-1.838
p-value of LM statistic[a]	0.0126	0.188	0.974	0.0284	0.698	0.0715	0.0271	0.181	0.530	0.0356	0.431	0.962	0.00554	0.0910	0.404
F-stat for weak ident.	6.324	0.495	0.000197	3.536	0.0355	0.608	3.579	0.401	0.0650	3.831	0.178	0.000483	9.488	0.975	0.169
	Results C: Humanitarian aid														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Humanitarian aid /GDP	-4.829	-24.34	-24.18	-1.922	-5.425	-43.44	1.295	0.743	2.491	10.94	0.573	-1,465	-2.625	3.832	-10.17
	(14.50)	(82.53)	(67.79)	(1.687)	(13.50)	(186.0)	(1.847)	(2.742)	(4.201)	(36.95)	(12.86)	(654,181)	(2.811)	(13.64)	(17.03)
Humanitarian aid x SI		4.000	4.014		-8.587	4.505		0.646	1.988		2.868	63.42		5.231	0.246
		(10.44)	(10.91)		(28.32)	(22.11)		(4.777)	(9.046)		(5.235)	(27,642)		(10.85)	(3.399)
Humanitarian aid x PV		1.966	1.904		6.772	32.72		0.366	1.008		-1.884	439.7		-4.841	5.507
		(6.485)	(9.157)		(18.28)	(149.2)		(2.736)	(3.688)		(2.803)	(196,648)		(10.43)	(9.626)
Humanitarian aid x SI x PV			0.0336			-8.961			-1.644			-73.80			-1.285
			(4.298)			(41.54)			(2.835)			(32,906)			(1.911)
R^2	-2.781	-28.625	-27.860	0.221	-15.203	-38.351	0.494	-0.196	-2.893	-4.669	-0.266	-31,229.81	-0.288	-4.391	-1.988
p-value of LM statistic[a]	0.724	0.814	0.695	0.154	0.710	0.830	0.116	0.368	0.569	0.756	0.414	0.998	0.327	0.635	0.511
F-stat for weak ident.	0.0948	0.0132	0.0252	1.536	0.0326	0.00783	1.999	0.172	0.0574	0.0853	0.203	1.07e-06	0.788	0.0628	0.0881

Notes: The control variables included are: logarithm of the initial level of income per capita, policy, and life expectancy, geography, inflation, the initial level of financial depth and of budget balance, revolutions, ethnic fractionalization, the three regional dummies, state ineffectiveness, political violence, the interaction between the latter two variables, and ODA loan repayments. Robust and cluster robust standard errors in parentheses for cross-country and panel estimates, respectively. *** p<0.01, ** p<0.05, * p<0.1. [a]The null hypothesis of the Kleibergen-Paap LM test is that the structural equation is underidentified.